

Appendix E

***MISSION BAY PARK
NATURAL RESOURCE MANAGEMENT PLAN***

Prepared by

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SUMMARY

The Natural Resource Management Plan recognizes the presence of natural resources in Mission Bay Park and provides guidelines and programs for the protection, enhancement, and management of these resources. The intent is that no net reduction of wildlife habitat will be allowed and that the overall quality of habitat will be improved. The Plan provides a framework to allow the continued improvement and maintenance of Mission Bay Park and still ensure viable productivity and protection of the Park's natural resources. Use of the Plan can help bridge what can sometimes be a gap between the requirement of human activities and the need to protect and manage natural resources. The Mission Bay Park Natural Resource Management Plan helps to clarify expectations for the protection of natural resources in the Park and to facilitate the granting of federal, state, and local permits for projects in the Park.

The guidelines for development and mitigation provided in the Management Plan include: dredging; methods of construction to minimize impacts to natural resources; beach maintenance restrictions; construction methods to reduce impacts to water quality; scheduling constraints; buffer zones, mitigation location restrictions; habitat replacement ratios such as 1:1 ratio for eelgrass, salt pan, salt marsh, and any coastal strand habitat supporting sensitive species; eelgrass mitigation options; mitigation plans; and mitigation monitoring plans.

A nesting site management program for the endangered California least tern proposes: coordination with resource agencies and regional experts; provision of suitable nesting substrate free of unnecessary vegetation; placement of least tern decoys; implementation of predator control; inclusion of chick protection devices; maintenance and installation of signs, gates, and fences; and provision for one person once a week for four months a year to aid in monitoring least tern nesting sites. Two of the seven least tern nesting sites in Mission Bay Park are proposed for alternate uses. These changes are considered to be significant adverse impacts but will be mitigated.

The western boundary of the Southern Wildlife Preserve in the Flood Control Channel is proposed for western expansion to a point in line with the east edge of Hospitality Point. Non-motorized watercraft would be allowed to utilize the area west of Ingraham Street Bridge from April through September by permit only. A maximum of 10 permits for any given day would be issued by the Park and Recreation Department. Fishing would only be allowed from Dog Beach. In addition to the salt marsh expansion at Crown Point Shores, previously discussed, another wildlife preserve is proposed for the approximately 110 acres of land currently occupied by sludge beds, south of the road on Fiesta Island. A variety of habitats would be created as part of the preserve. This preserve would also include an embayment for the planting of eelgrass. The eelgrass embayment, as well as the new preserve areas, would be considered a mitigation "bank". The bank would provide mitigation credit for future projects.

Educational and research opportunities are provided for in the Management Plan. Regular eelgrass surveys (every 3 years), general bird surveys (every 5 years), and least tern foraging studies (2 consecutive years) are proposed. Efforts to cooperate in sharing of information with universities and individuals is encouraged with the goal of maintaining a current data base. Educational signs are proposed and would be strategically placed for maximum benefit without creating negative environmental impacts. A small nature center and boardwalk system is proposed for either the new preserve expansion at Crown Point Shores or the northwestern corner of the new preserve for Fiesta Island. The nature center complex would include a small structure (about 1,000 square feet), interpretive displays and signs, observation platforms, and a nature trail boardwalk system. The nature center design would be unobtrusive and blend with the preserve. It would serve as a focal point for nature enthusiasts, school and community groups for educational tours, and a focal place for natural resource management meetings.

The Mission Bay Park Natural Resource Management Plan - Technical Appendices is available for referencing the most recent eelgrass, bird and least tern data, as well as resource agency information pertinent in developing mitigation plans. The Appendices will be periodically updated to keep the data current and expanded as data becomes available for other resources.

INTRODUCTION

PURPOSE

The primary purpose of the Mission Bay Park Natural Resource Management Plan is to allow the continued improvement and maintenance of Mission Bay Park and still ensure viable productivity of the Park and its various natural resources. This Plan is intended to not only recognize the presence of natural resources, especially sensitive natural resources, but also provide for the protection, enhancement and management of these resources. The Natural Resource Management Plan provides for comprehensive management of sensitive biological resources, and ensures that these resources are properly considered during the planning and development of projects and master plan areas in Mission Bay Park.

Preparation of the Mission Bay Park Natural Resource Management Plan involved close coordination with affected agencies, including the California Coastal Commission, California Department of Fish and Game, National Marine Fisheries Service, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and the University of California Natural Reserve System. A comprehensive plan specifying the future character of Mission Bay Park's natural resources will facilitate the review of individual permit applications by these agencies. Under the present system, assessment of the collective impacts and the effectiveness of mitigation for individual project proposals is difficult. With the Natural Resource Management Plan, a comprehensive approach to habitat protection can help clarify development expectations, and facilitate granting project permits which are in conformance with the Management Plan.

The purpose, goals, and objectives of the Natural Resource Management Plan are established as long-range, 100-year goals. The guidelines outlined in the Plan will be updated at least every eight to ten years with input from resource and trustee agencies and technical experts.

The Mission Bay Park Natural Resource Management Plan is viewed as a tool to bridge what can sometimes be a gap between the requirements of human activities and the need to protect and manage natural resources in Mission Bay Park. The resource agencies are charged with the singular mission of protecting all biological resources in the Park to the fullest extent possible. This mission can conflict with recreational interests who cite the following reasons in support of recreational use in the Park: the artificial nature of the Bay created from an extensive dredging program; the original intent of the Park development for recreation; and the demonstrated need and desire for additional recreational development.

A major goal of this Natural Resource Management Plan is to demonstrate the City's recognition of the rich and varied biological resources of the Park. The Plan highlights the recreational fishing, bird-watching, and aesthetic enjoyment provided by these resources, and recognizes them as an integral part of Mission Bay Park.

Another goal of this Plan is to designate environmentally sensitive habitats and establish requirements for: 1) enhancement and restoration activities; 2) maintenance programs; and 3) appropriate buffer areas or other restrictions on urban encroachments that conflict with protection of sensitive resources. The Plan provides for agreements between the City and resource agencies as to the maintenance responsibilities for regional natural resources, such as least terns and eelgrass.

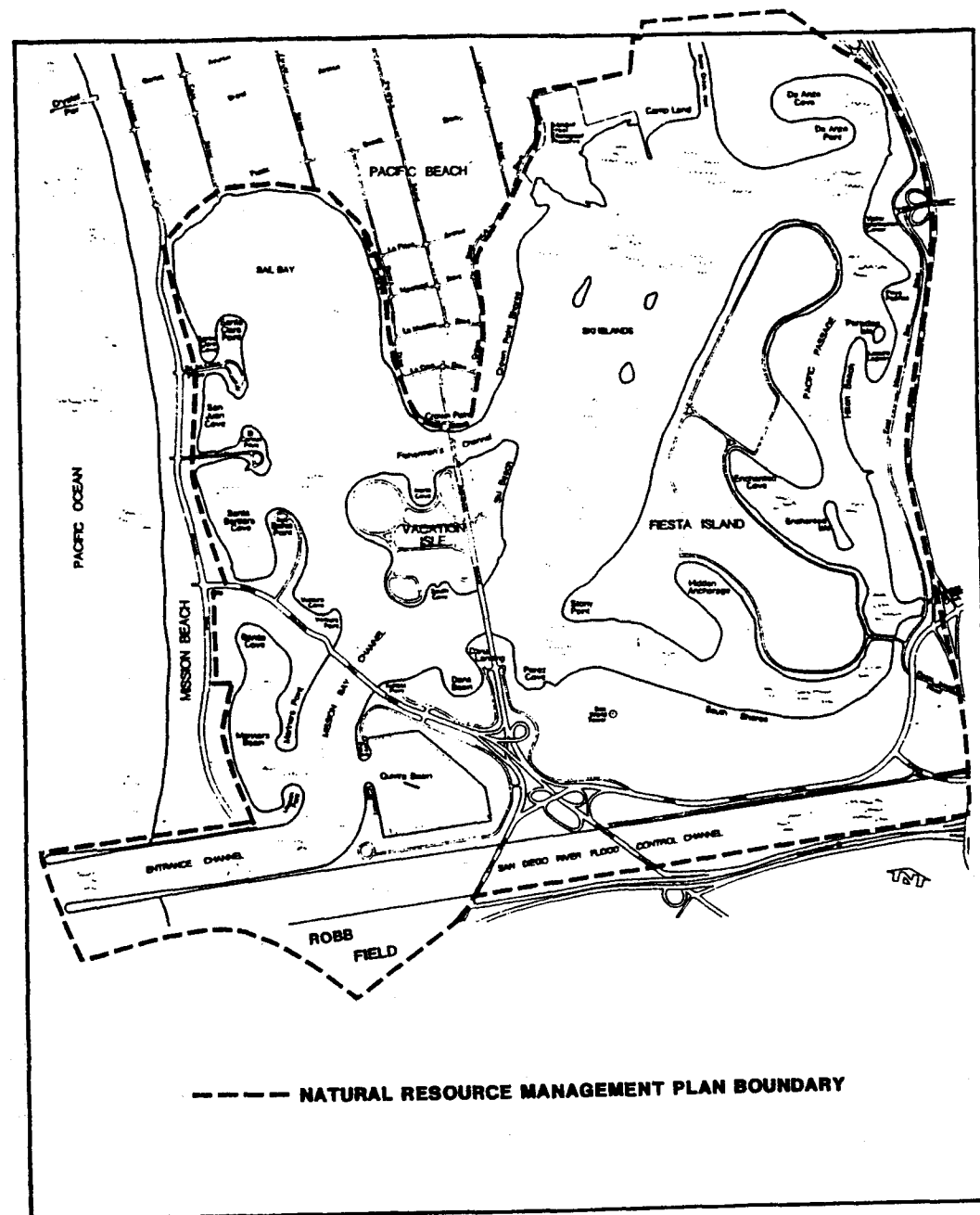
OBJECTIVES

The objectives of the Natural Resource Management Plan are:

1. To establish management practices to preserve and protect biological resources while providing for future recreational development, maintenance, and land use in Mission Bay Park.
2. To provide a framework for mitigation acceptable to the City and resource and permitting agencies.
3. To provide opportunities for innovative resource enhancement in Mission Bay Park.
4. To establish a foundation for increased educational and research opportunities in the Park.

HISTORY

Until the late 1940's, Mission Bay was a shallow, unnavigable backwater supporting saltwater marsh, swamp, and mud flat habitats. A federally approved project for flood control of the San Diego River and for small boat navigation in Mission Bay began in 1946. As part of this project, dredging activities occurred from 1946 to 1961 until Mission Bay and the San Diego River Flood Control Channel reached their current configuration (Figure 1). Extensive public and private funding supported development of most of Mission Bay's shoreline. Fiesta Island and portions of South Shores are the only major areas yet to be developed or designated for particular land use (Figure 1).



NATURAL RESOURCE MANAGEMENT PLAN SETTING

Environmental Quality Division
CITY OF SAN DIEGO · PLANNING DEPARTMENT

FIGURE 1

AGENCY JURISDICTION AND APPLICABLE CITY PLANS

AGENCY JURISDICTION

A number of agencies have direct or indirect involvement with land use planning and permit approvals for Mission Bay Park. The primary agencies and their degrees of involvement with activities in the Park are as follows:

City of San Diego: The day-to-day management of Mission Bay Park is the responsibility of the Park and Recreation Department, operating under the authority of the City Manager. The Coastal Division of the Park and Recreation Department performs tasks such as repairing eroded shorelines, cleaning and grooming beaches, maintaining landscaped and ecological areas, and maintaining recreational facilities. Lifeguard Services is also a division of the Park and Recreation Department. The lifeguards provide law enforcement and promote aquatic safety on the Bay. The Coastal Division, Mission Bay Park Manager, and lifeguard office is located on Hospitality Point near the Entrance Channel.

Other City departments involved in Mission Bay Park include the Water Utilities Department, Planning Department, Property Department, Police Department, Fire Department, and General Services Department. Water Utilities involvement is focused on Fiesta Island, where City sludge drying beds are located. Water Utilities currently operates the sludge beds and maintains two least tern sites on the island. The involvement of Water Utilities will dissipate once the sludge beds are removed. Responsibility for that portion of Fiesta Island and the tern sites will then revert back to the Park and Recreation Department.

A primary involvement of the Planning Department is centered around the environmental review process. It is through this process that the agencies and the public become involved in the decisionmaking process for master plan and individual project proposals. The Planning Department serves as a liaison between the City, the public, and the agencies. A Mission Bay Park steering committee headed by the Planning and Park and Recreation departments allows for interdepartmental communication and planning for Mission Bay Park. The Planning Department also has a Resource Management Division whose primary purpose is the protection of environmental resources within the City of San Diego. The Long-Range Planning Division of the Planning Department is responsible for updating the Mission Bay Park Master Plan and developing other Specific Plans for areas, such as Fiesta Island, of Mission Bay Park.

California Coastal Commission: The California Coastal Commission (CCC) is charged with administering the California Coastal Act of 1976. This Act requires local governments to prepare a Local Coastal Program (LCP) for those areas located within the Coastal Zone. The LCP is intended to bring the local government's planning process into conformance with the policies

and provision of the Coastal Act. All LCP's include a Land Use Plan (LUP) and implementing ordinances. This Natural Resource Management Plan outlines resource policies and could serve as an element of the LUP for Mission Bay Park.

The Coastal Commission retains authority for all development projects within the Coastal Zone until the LCP is adopted. Once the LCP is implemented, permit authority reverts to the local agency. All projects within Mission Bay Park currently are under the CCC jurisdiction until the City adopts the LCP. Much of Mission Bay Park, however, will remain in the CCC jurisdiction since much of the Bay area is classified as tidelands. Under the Coastal Act, permit actions on tideland areas can be appealed to the CCC even if the LCP is adopted and being implemented. Thus, development proposals will be subject to CCC review indefinitely.

U.S. Army Corps of Engineers: The Army Corps of Engineers (ACE) exercises permit authority in Mission Bay Park for projects which require permits under either Section 10 of the River and Harbor Act of 1899 or Section 404 of the Clean Water Act. Projects which involve activities (e.g., dredging or placement of structures) in navigable water need a Section 10 permit. Projects which involve the discharge of fill or dredge material into waters of the United States must secure a Section 404 permit.

California Department of Fish and Game: Involvement of the California Fish and Game Department (CDFG) occurs one of two ways. For projects involving alteration of a streambed, a permit must be issued pursuant to Sections 1601-1606 of the CDFG Code. Within Mission Bay Park, this type of permit would be required for development or maintenance activities in Rose Creek, Tecolote Creek, or the San Diego River Flood Control Channel.

The second type of involvement would occur with the CDFG serving in an advisory capacity to the CCC or ACE.

U.S. Fish and Wildlife Service: The U.S. Fish and Wildlife Service (USFWS) acts in an advisory role with projects which require an ACE permit (Section 10 or Section 404). The USFWS also serves in an advisory capacity regarding CCC permits and other permit actions. Of particular importance to the USFWS is the status of plants and animals which occur on the List of Endangered and Threatened Species, which are protected under the Endangered Species Act of 1973. Two federally-listed, endangered species, California least tern and light-footed clapper rail, nest in Mission Bay Park.

National Marine Fisheries Service: The National Marine Fisheries Service (NMFS) is involved in a similar capacity as the USFWS. NMFS provides comments on ACE permits, CCC permits, and other permits, as appropriate.

Regional Water Quality Control Board: The Regional Water Quality Control Board (RWQCB) issues permits for activities in Mission Bay. Generally, a permit is required for any project involving dredging or filling of 5,000 cubic yards of material within the Bay waters. The RWQCB serves in an advisory capacity to the CCC and other agencies.

Other Agencies: Other agencies with jurisdiction in Mission Bay Park include the State Lands Commission and U.S. Coast Guard. The involvement of these agencies with natural resources in Mission Bay Park is limited.

CITY PLANS APPLICABLE TO MISSION BAY PARK NATURAL RESOURCES

The two major planning documents pertaining to Mission Bay Park are (1) the Mission Bay Park Master Plan for Land and Water Use (1978); and (2) the Local Coastal Program Addendum to the Mission Bay Park Master Plan for Land and Water Use (1982).

The following 1978 Master Plan recommendations affect natural resources:

Establish a carrying capacity for natural resources and public facilities within the Park, and develop a management program to prevent overuse of the areas as the demand for outdoor recreation increases. (page 82)

Limit or restrict the public's physical access to each area of the Park only for safety or environmental considerations.... (page 84)

The Rose Creek Channel should no longer be dredged more than the minimum depth required for flood control purposes. (page 54)

Monitor the use of the very northwestern portion of Fiesta Bay to insure that power boat activities do not unduly disturb the Northern Wildlife Preserve. (page 85)

Restrict activities in the Flood Control Channel primarily to the area west of the Sunset Cliffs Boulevard Bridge, and require that any noise generating aquatic event in the Channel have the prior approval of the Park and Recreation Director. (page 85)

Provide signing, fencing, and use restrictions in adjacent areas to protect the Northern and Southern Wildlife preserves. (page 89)

Continue the existing water quality sampling program in Mission Bay, and expand monitoring activities to include factors relevant to the preservation of wildlife. (page 89)

Establish an ongoing environmental monitoring program to provide periodic data on the status of the wildlife reserves and other sections of the Park. It is suggested that an agreement be established between the City and local colleges and universities, or an environmental consultant be retained on a continuing basis, to provide the service. (page 89)

Develop a program with the Regional Water Quality Control Board to mitigate the possibly adverse effects of boating activities through spilled fuels, non-use of holding tanks, and dumping. (page 89)

Rechannel the storm drains emptying into Mission Bay and Tecolote Creek to an environmentally suitable outfall. (page 89)

Continue to set aside habitat essential to the preservation of rare and endangered species. Of special importance is the City's continued participation in the Least Tern Recovery Team, a multi-agency project to coordinate efforts for protection and enhancement of least tern nesting sites in San Diego. Public posting of all existing wildlife preserves should be instituted. (page 89)

Limit dredging of Mission Bay waters to... 4) wildlife refuge habitat restoring and managing; and 5) restoring water circulation. Dredging shall be planned, scheduled, and carried out to avoid undue disruption to fish and bird breeding and migrations, marine habitats, and water circulation. (page 90)

The Local Coastal Program Addendum (1982) incorporates recommendations outlined in the 1978 Master Plan and further clarifies and reinforces those recommendations. The LCP adds the following clarifications:

"The restoration of the Rose Creek/Northern Wildlife preservation should be part of a resource management program (work program for such a management program submitted as a separate document) to be developed to address the protection and restoration of sensitive habitats... A determination concerning the addition of Campland to the Northern Wildlife Preserve and excavation of the site to allow for marsh reestablishment, should be part of this program. The Coastal Conservancy should be involved in this as a restoration project." (page 20)

The Least Tern Management Program is called out in the LCP as "a primary element of a more comprehensive Resource Management Program... Other management elements proposed include programs for the Kendall-Frost/North Reserve/Rose Creek Complex, San Diego River Flood Control Channel...". (page 27)

EXISTING CONDITIONS

Mission Bay Park is a 4,600-acre recreational park in southern California. Figure 1 shows the Park location northwest of downtown San Diego, bounded by Interstate 5 to the east, the community of Pacific Beach to the north, Mission Beach to the west, and Ocean Beach to the south.

The existing conditions outlined in this section are summarized primarily from the Mission Bay Park Shoreline Restoration and Stabilization Project Environmental Impact Report (1989).

BIOLOGICAL RESOURCES

Biological resources in Mission Bay Park include a wide range of marine habitats, a prime example of coastal salt marsh, and a variety of birds, including endangered species.

MARINE RESOURCES

Five different marine communities occur in Mission Bay: sand bottom, mud bottom, hard bottom, eelgrass meadows, and open water.

Sand Bottom: Sand bottom habitat is found along shoreline intertidal zones (area between extreme high and low tides) and in high energy water movement areas, such as the Entrance Channel, the Bay bridge channels, and at the mouth of the Flood Control Channel. The dominant invertebrates in this habitat include polychaete worms, armored sand stars (Astropecten armatus), swimming crabs (Portunus xantusii), sea pansy (Renilla kollikeri), and sea pen (Stylatula elongata). The population of sand dollars (Dendraster excentricus) in Mission Bay has fluctuated in the past but is currently dense in the Entrance Channel. Fish associated with sand bottoms in the Bay are California halibut (Paralichthys californicus), diamond turbot (Hypsopsetta guttulata), barred sand bass (Paralabrax nebulifer), and spotted sand bass (Paralabrax maculatofasciatus).

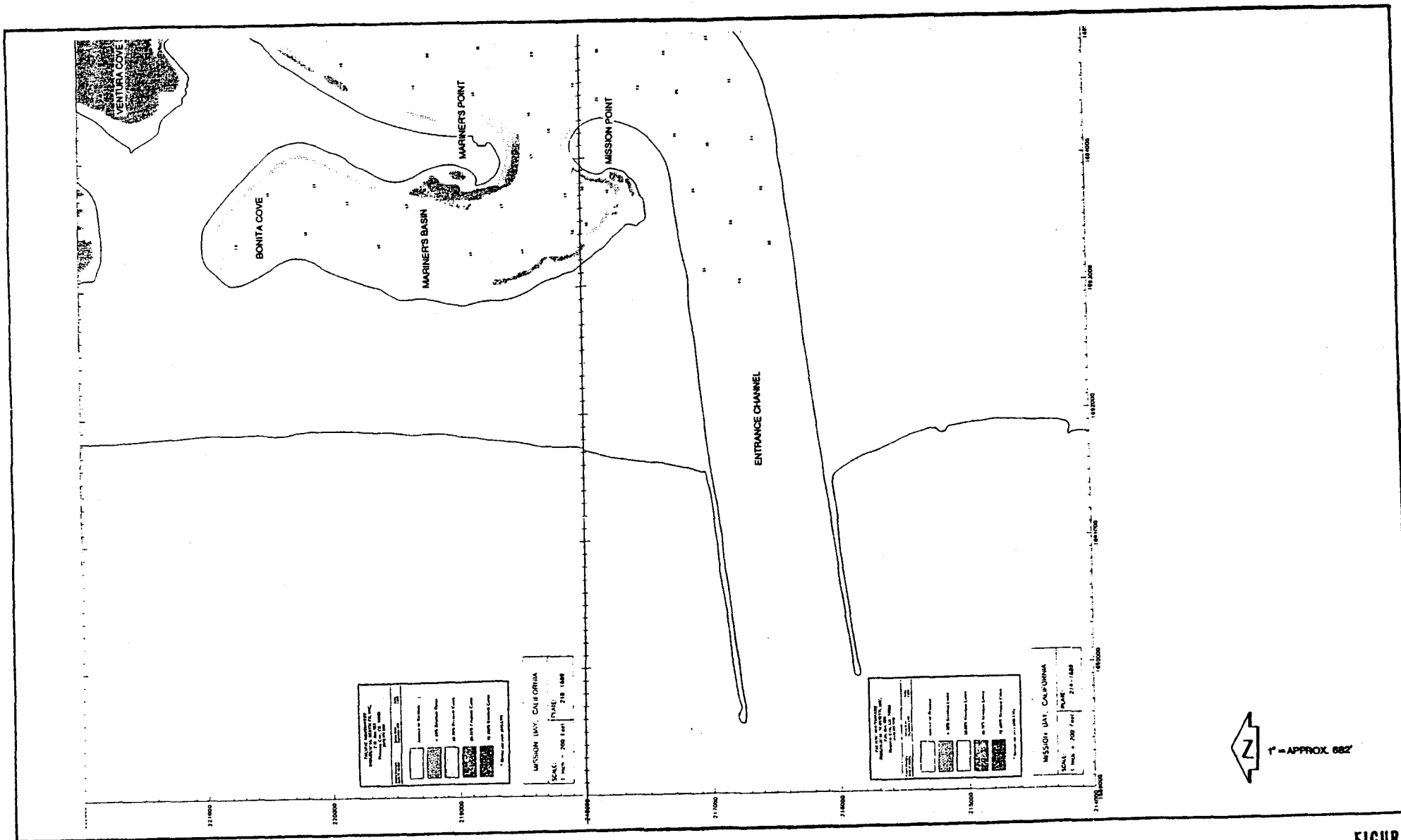
Mud Bottom: The dominant subtidal (below the area of tidal fluctuation) habitat in Mission Bay Park is mud bottom. Mud bottom habitat, however, also occurs from intertidal mudflats in the Northern Wildlife Preserve to the deepest part of the Bay and in the Southern Wildlife Preserve. This habitat is a more stable substrate and has a higher organic content than sand. It is present in areas of slow water movement and seasonal sediment deposition. Typical species found in this habitat are moon snails (Polinices and Natica spp.), California bubble snail (Bulla gouldiana), polychaete worms, swimming crabs, ghost shrimp (Callinassa spp.), mud shrimp (Upogebia pugettensis), a tubicolous anemone (Pachycerianthus spp.), and light-bulb tunicate (Clavelina hunsmani). Fleshy stalked bryozoan (Zoobotryon verticillatum) densely populate some areas during the summer. Fish frequenting mud bottom habitat include California halibut, diamond turbot, bat ray (Myliobatis californica), butterfly ray (Gymnura

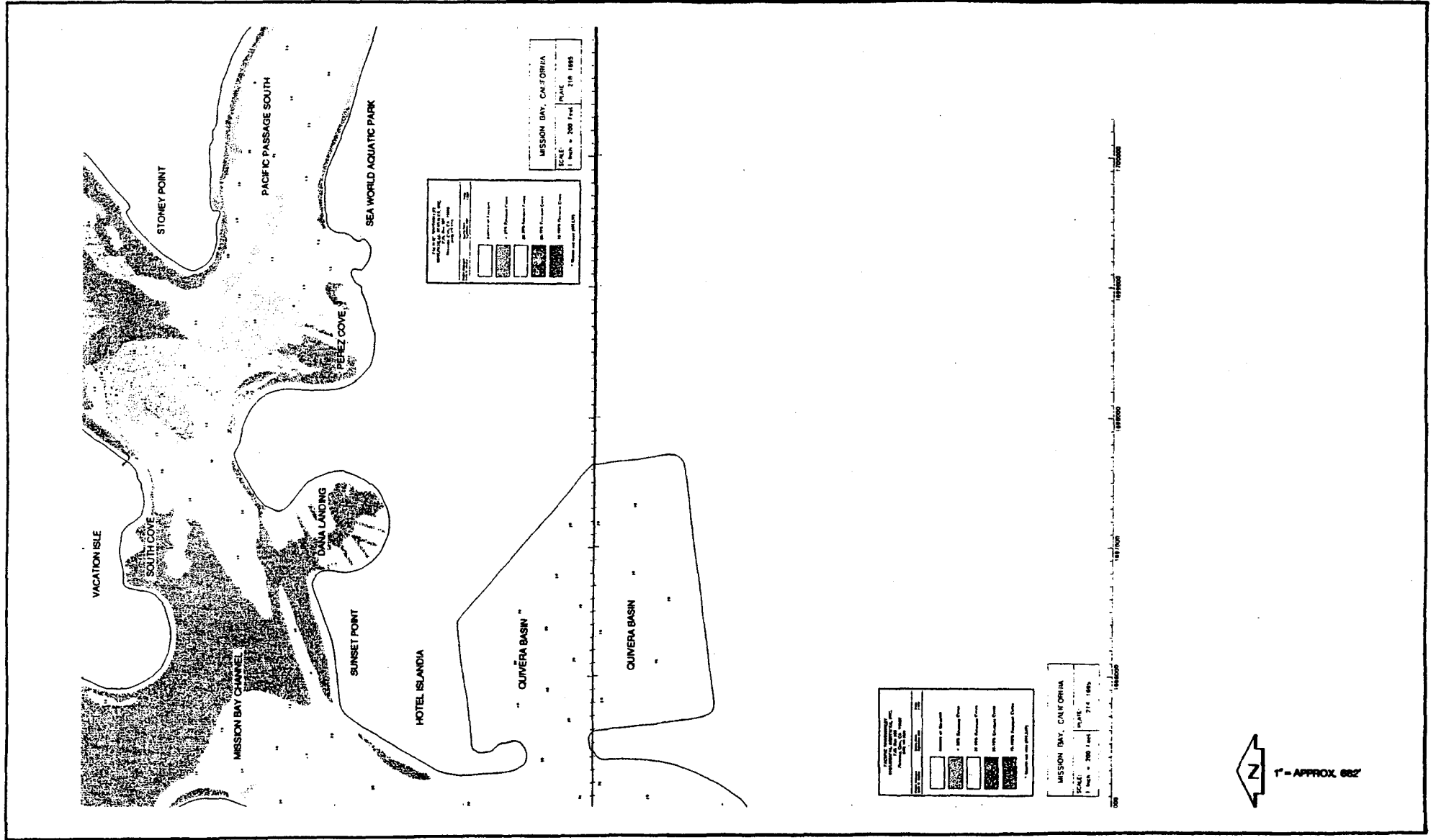
marmorata), and long-jawed mudsucker (Gillichthys mirabilis). Round rays (Urolophus halleri) are abundant in this habitat. Shallow (less than three feet), protected subtidal areas with either mud or sand bottoms, are important as nursery habitat for juvenile California halibut.

Hard Bottom: Hard bottom habitat in Mission Bay is associated with manmade hard substrate, such as riprap, bridge and pier pilings, docks, and concrete storm drains. Organisms in the Entrance Channel, west of West Mission Bay Drive Bridge, are found in greater numbers than in other hard substrate areas of the Bay. This is due to the preference for the cooler, less turbid water, the more intense water motion, and the less variable salinity conditions found in the Entrance Channel. Species commonly occurring in this habitat include: low-growing coralline algae (Corallina vancouveriensis, Bossiella orbignina, Gigartina spp.); giant kelp (Macrocystis pyrifera); sea fans (Muricea californica and M. fruticosa); sea stars (Pisaster giganteus, P. ochraceus); sea urchins (Strongylocentrotus franciscanus and S. purpuratus); and mollusks (Astraea undosa, Aplysiavaccaria spp., Haliotis spp.). Fish associated with the Entrance Channel riprap are garibaldi (Hypsypops rubicundus), kelpfish (Gibbonsia spp.), giant kelpfish (Heterostichus rostratus), and kelp surfperch (Brachyistius frenatus). Other hard substrate habitat in the Bay is dominated by bay mussel (Mytilus edulis), rock scallop (Hinnites multirugosus), barnacles (Tetracita squamosa and Balanus amphitrite), algae (Egregia laevigata and Gigartina, spp.) and macroalgae (Sargassum muticum and Codium fragile). Fish associated with hard substrate in the Bay include kelpbass (Paralabrax clathratus), barred sand bass (Paralabrax nebulifer), California scorpionfish (Scorpaena guttata), and opaleye (Girella nigricans).

Eelgrass Meadows: Eelgrass (Zostera marina) is an aquatic grass which grows on the low intertidal to high subtidal slopes in Mission Bay and the Flood Control Channel. Eelgrass plays a particularly important role in the marine ecology of bay and channel waters. Eelgrass is a direct food source for some fish and bird species. Invertebrates attached to eelgrass serve as a food source for many fish species inhabiting eelgrass beds. Disintegrating eelgrass supports amphipods and phytoplankton populations, which are sources of food for fish in the water column. In addition to a primary and secondary food producer, eelgrass plays an important role by providing a structural component to bay and channel bottoms. Eelgrass beds also provide protection for shrimps, crabs, scallops, and juvenile fish.

Substantial eelgrass habitat is present in Mission Bay and the Flood Control Channel, second in area only to mud bottom habitat (EIR 1989, PCBS 1988). Eelgrass meadows graduate into mud bottom. Eelgrass distribution in Mission Bay during 1988 is shown in Figures 2A to 2F. Future eelgrass surveys updating the 1988 data will be available in the Mission Bay Park Natural Resource Management Plan - Technical Appendices, a separate document.

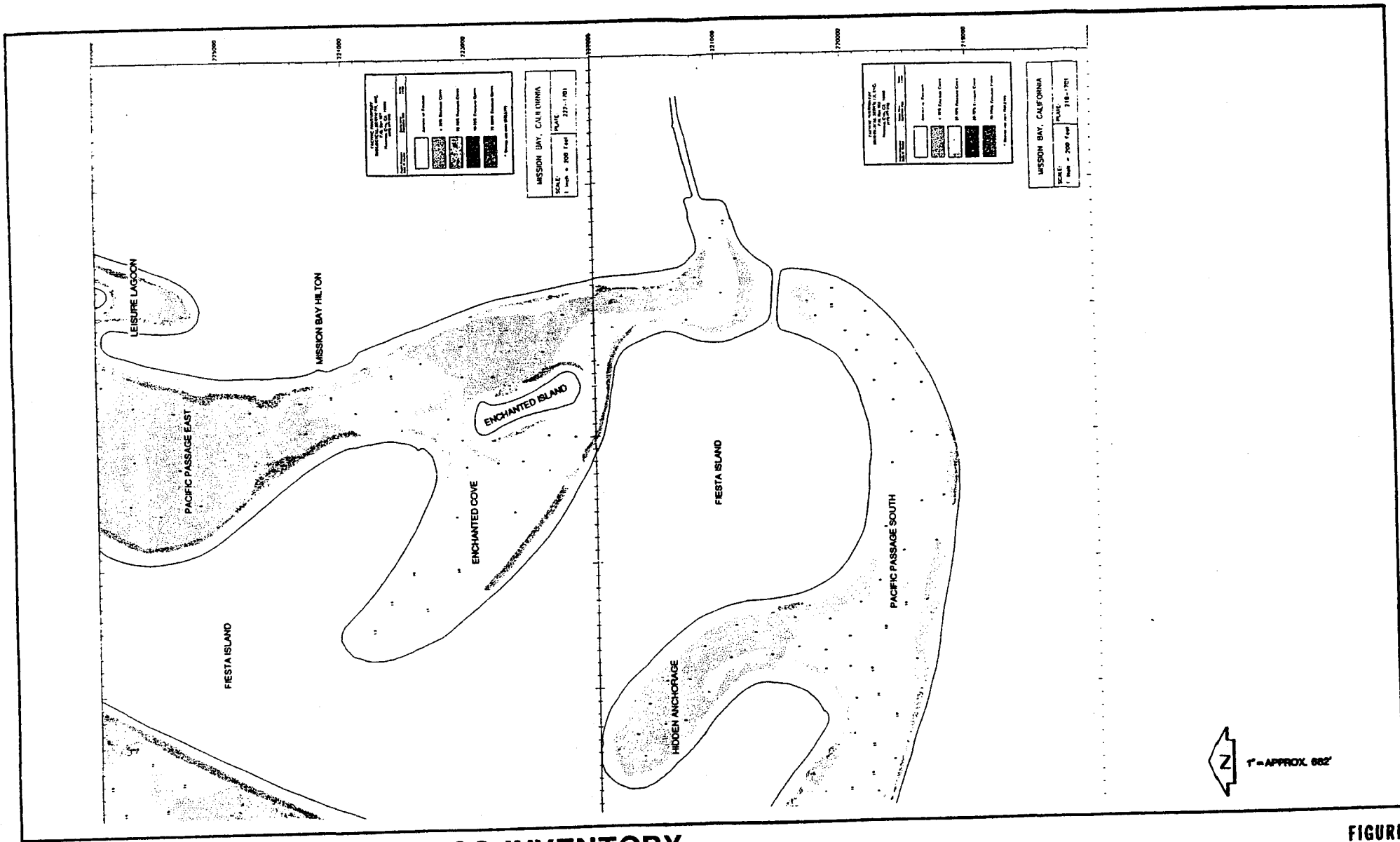




MISSION BAY EELGRASS INVENTORY

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FIGURE
2B



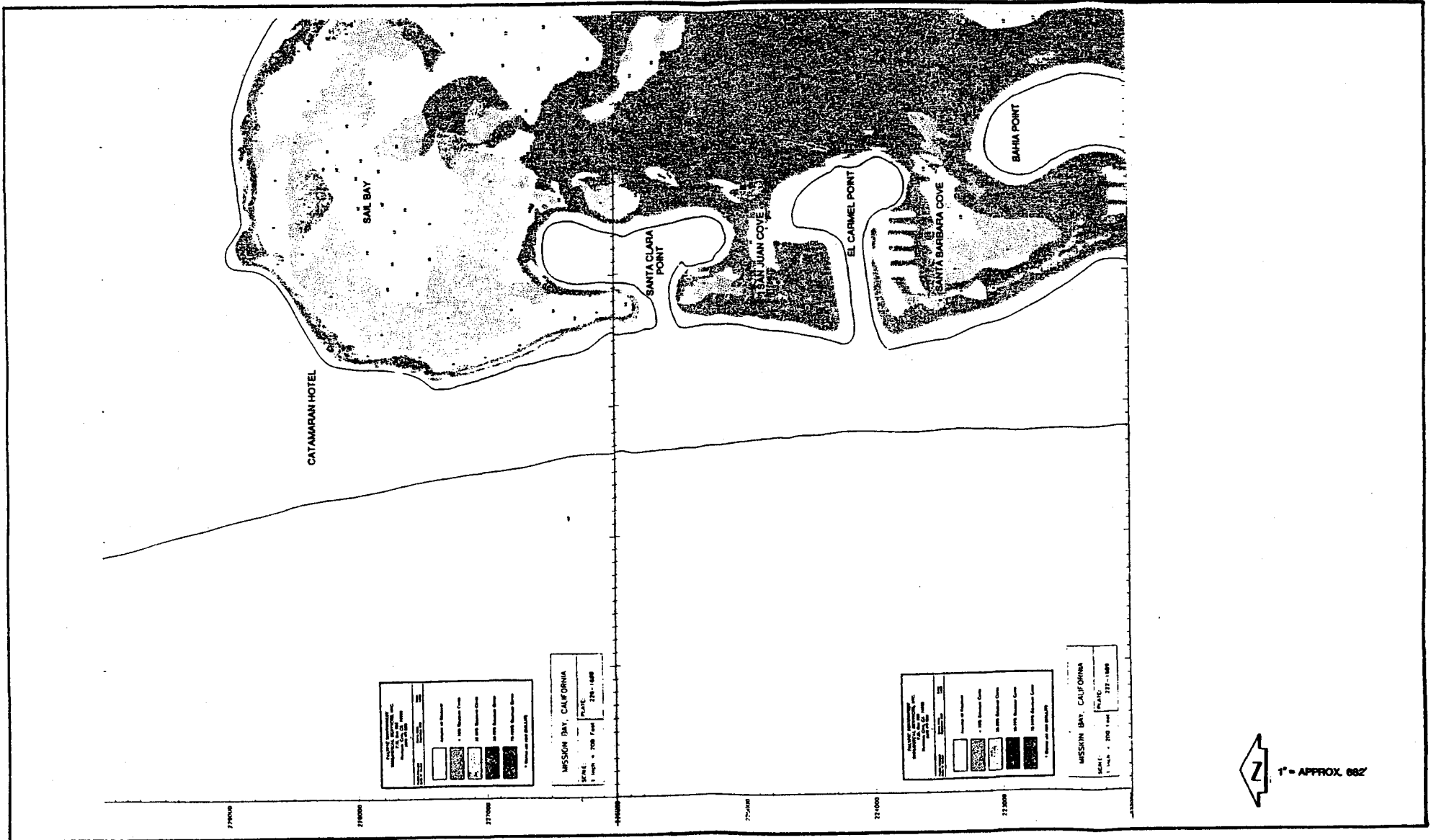
MISSION BAY EELGRASS INVENTORY



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10c

FIGURE
2C

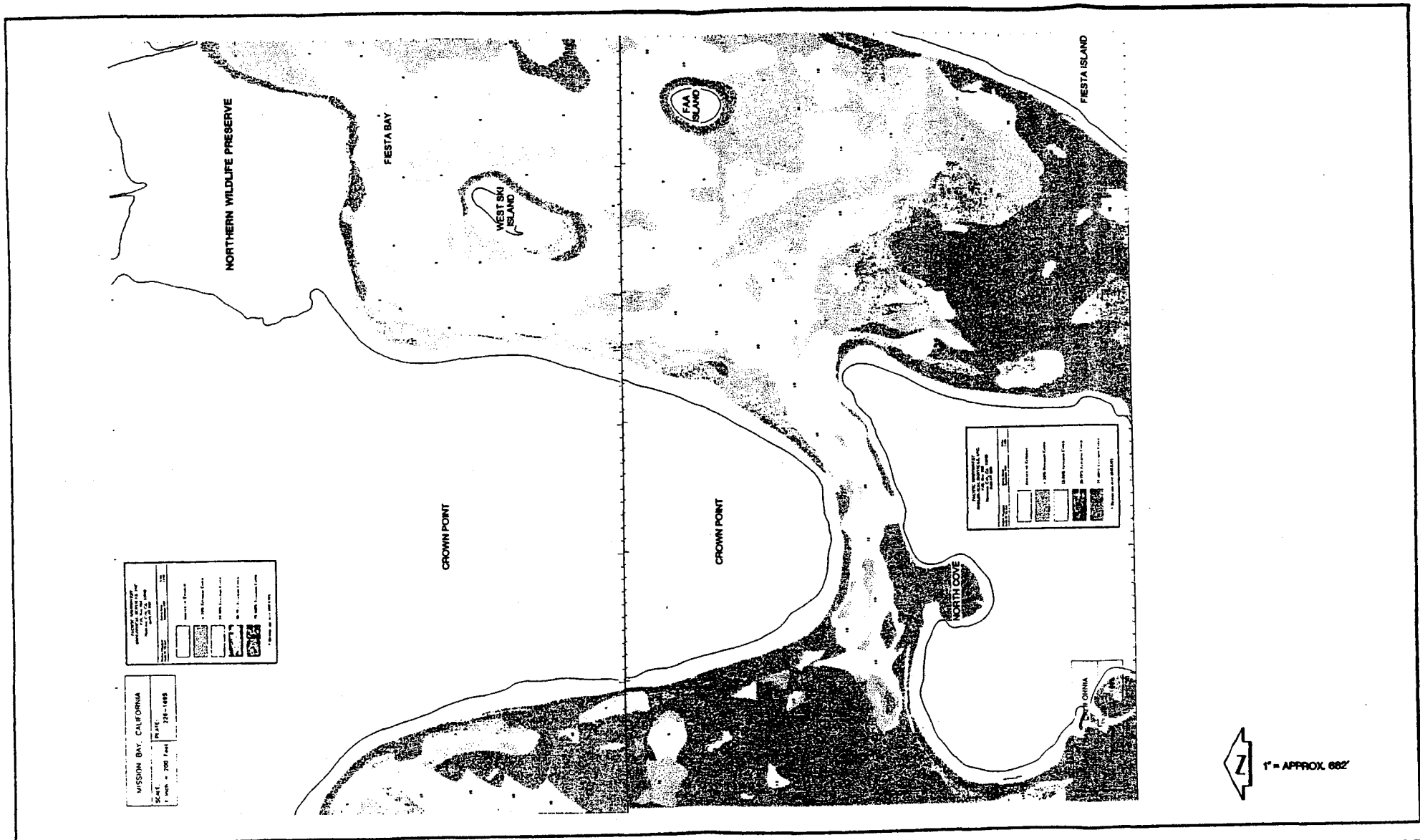


MISSION BAY EELGRASS INVENTORY

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FIGURE

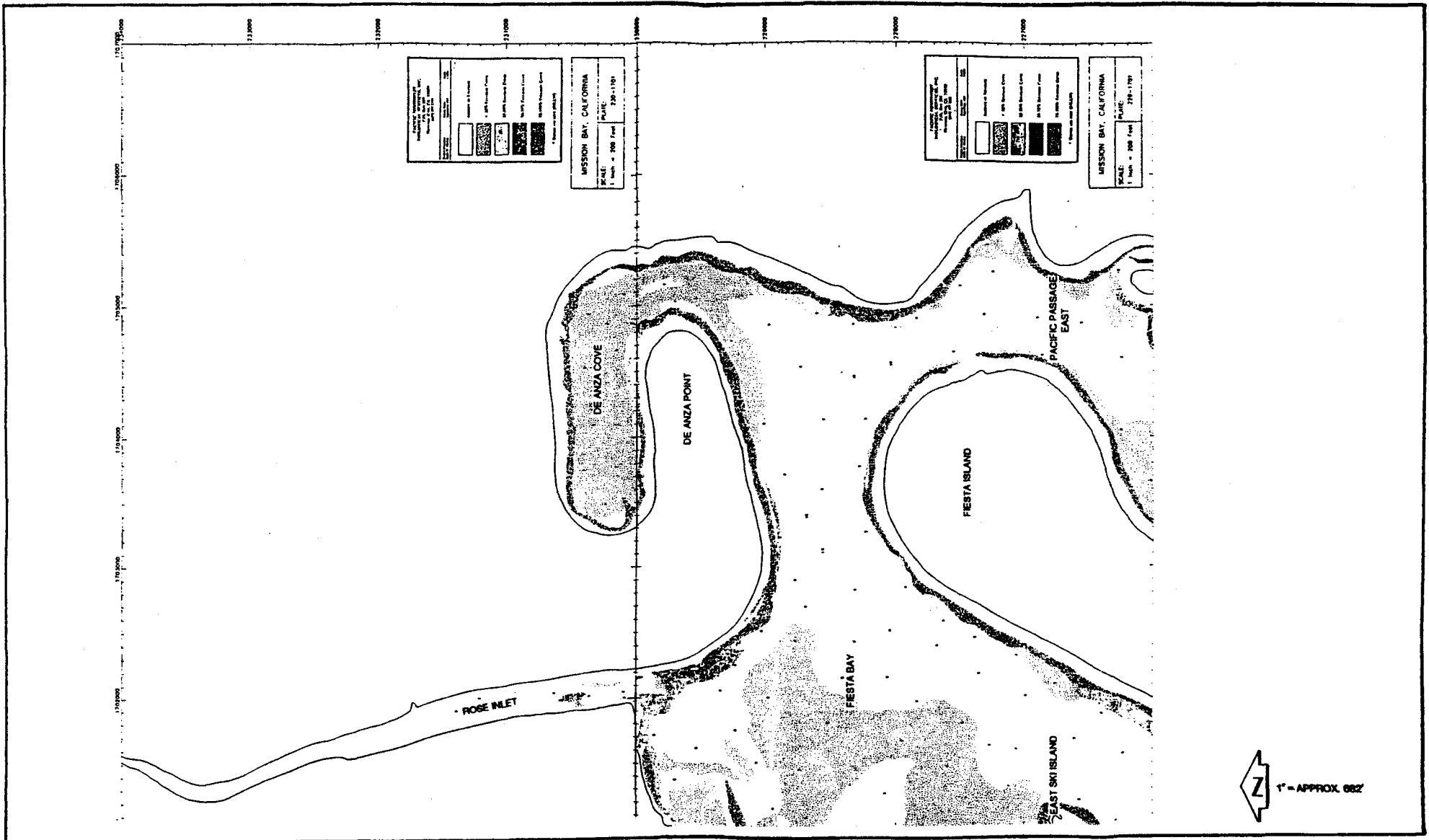
2D



MISSION BAY EELGRASS INVENTORY

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FIGURE
2E



MISSION BAY EELGRASS INVENTORY

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FIGURE

2F

The extent of eelgrass beds in Mission Bay and the Flood Control Channel fluctuates in response to seasonal conditions and water quality. Factors which affect eelgrass distribution include light, water quality (turbidity), and substrate. Eelgrass grows in water as shallow as +1 Mean Lower Low Water (MLLW) down to -6MLLW where the water temperature is warm and the light is good. At depths between -6 and -9MLLW, eelgrass scatters widely across the bottom due to marginal conditions. In deeper water, eelgrass does not receive the temperature and light needed for growth. Years of heavy rainfall create more turbid conditions and discourage eelgrass growth. Shading from dock structures and boats has been shown to prevent eelgrass growth in the Bay. Turbidity caused by propeller action in shallow water may also impact normal growth. Eelgrass distribution is also impacted by dredging and construction activities in shallow areas. The last major eelgrass beds in southern California are found in Mission Bay and San Diego Bay. This limited distribution increases the importance of the eelgrass habitat in Mission Bay.

Dominant organisms found in eelgrass beds include algae (Ceramium flaccidum), stalked bryozoan (Zoobotryon verticillatum), epiphytic bryozoan (Membranipora spp.), and broad-eared scallop (Leptopecten latiauratus). Small gastropods (such as chink snail, Lacuna marmorata, and painted limpet, Notacmea depicta) graze in the epiphytic (attached to but causing no harm) growth on the eelgrass blades. Sea hares (Aplysia californica) graze in the eelgrass. Twenty species of fish have been found in Mission Bay eelgrass beds. The most abundant species are gobies (Gobidae spp.), topsmelt (Atherinops affinis), and California halibut (Paralichthys californicus). Other representative species include bay pipefish (Syngnathus griseolineatus), dwarf surfperch (Micrometrus minimus), giant kelpfish, and bay blenny (Hysoblennius gentilis).

Open Water: Many organisms are not restricted to specific habitats in the Bay and the Flood Control Channel; these are called pelagic or water column species. Phytoplankton and zooplankton (microscopic plants and animals which move passively with the tides) in Mission Bay include diatoms, dinoflagellates, polychaete and gastropod larval, copepods, cladocerans, and uerochordates. High densities of moon jelly fish (Aurelia aurita) have been documented periodically in Mission Bay. Pelagic fish in the Bay and the Channel include schools of topsmelt, striped mullet (Mugil cephalus), anchovies (Engraulis mordax and Anchoa spp.), and queenfish (Seriphus politus).

Several sportfish, including California halibut, kelpbass, barred sand bass, California barracuda (Sphyraena argentea), and Pacific bonita (Sarda chiliensis), inhabit Mission Bay.

WETLAND RESOURCES

Only one type of wetland habitat occurs in Mission Bay Park: coastal salt marsh.

Coastal Salt Marsh: Considered one of the best examples of coastal salt marsh remaining in southern California, the Northern Wildlife Preserve is located at the northeastern section of Mission Bay Park (Figure 3). The Preserve is comprised of about 15 acres of City-owned land and 16 acres owned by the University of California at San Diego (UCSD) and known as the Kendall-Frost Mission Bay Marsh Reserve. This Northern Wildlife Preserve is the last remnant of salt marsh in Mission Bay. The marsh vegetation is influenced by runoff and tidal action. Lower elevations are dominated by cordgrass (*Spartina foliosa*); mid elevations by saltwort (*Batis maritima*) and pickleweed (*Salicornia virginica* and *S. bigelovii*); and higher elevations by *Suaeda californica*, alkali-theatu (*Frankenia grandifolia*), and sea lavender (*Limonium californicum*). Two invasive species, river mangrove (*Aegiceras corniculatum*) and manawa (*Avicenia marina resinifera*), planted in the Preserve in 1966-69 threaten the integrity of this habitat. Annual attempts by UCSD to eradicate these species has reduced the numbers of these species and effectively removed their intrusion.

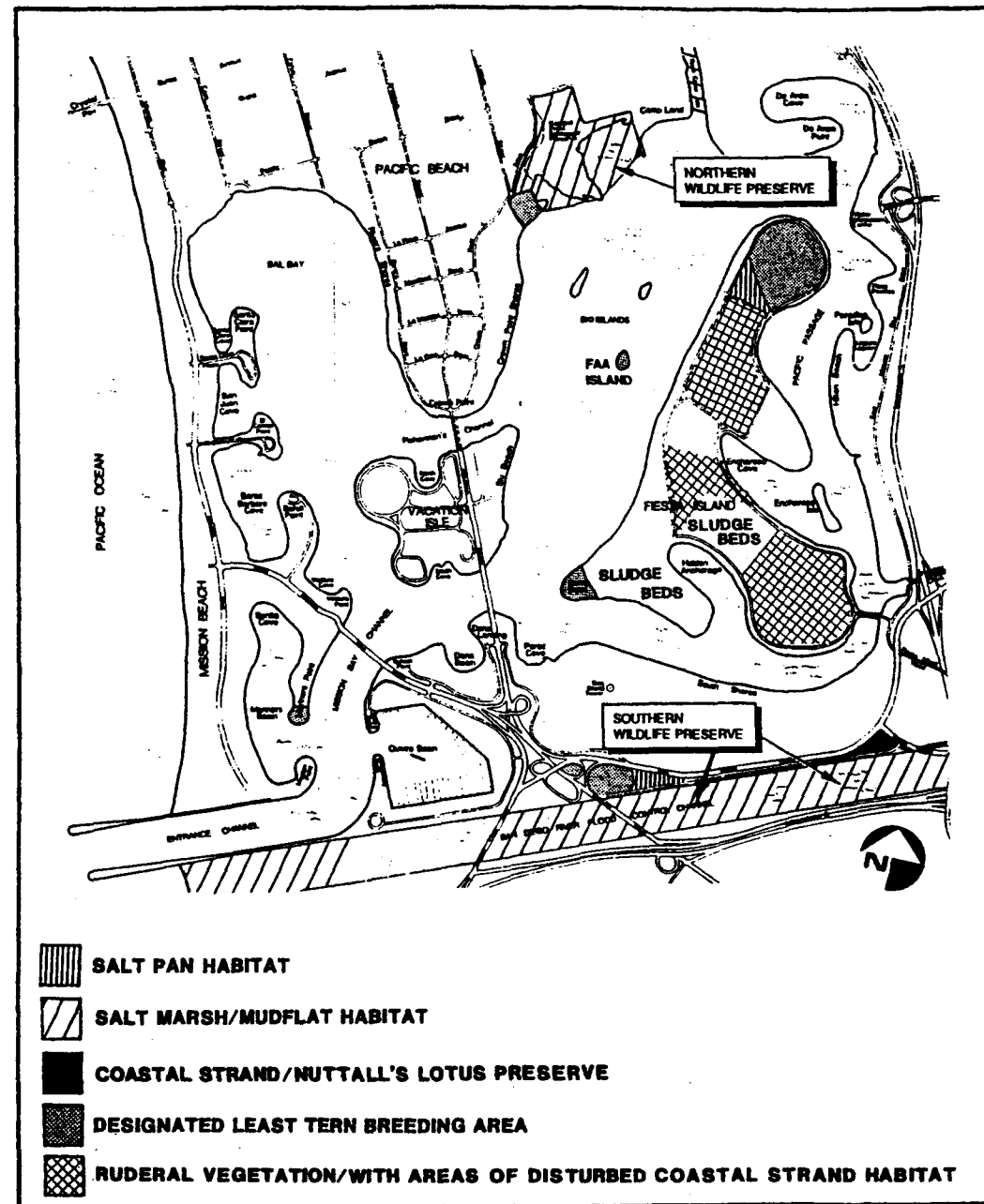
Rose Creek inlet is not included in a Preserve but contains small patches of marsh habitat along both sides of the creek channel north of Pacific Beach Drive. At the mouth of the Creek, near Grand Avenue bridge, patches of cordgrass grow and further up the creek pickleweed is present. The creek vegetation changes to brackish, disturbed wetland midway between Grand and Garnet avenues. This overgrown, weedy vegetation includes mulefat (*Bacharris glutinosa*), castor bean (*Ricinus communis*), and willow (*Salix*, spp.).

The Southern Wildlife Preserve salt marsh is located in the Flood Control Channel (Figure 3). This salt marsh is a less diverse marsh than that present in the Northern Preserve due to the fluctuations in salinity. These fluctuations result from the introduction of large volumes of fresh water released from upstream reservoirs or created during flood events. The dominant vegetation in the Preserve and the rest of the Flood Control Channel shifts depending on the degree of freshwater influence. The primary species currently found in the salt marsh are pickleweed, cord grass, and salt wort. The eastern end of the Channel (near Interstate 5) includes more brackish or freshwater species, such as cattails (*Typha* spp.) and spiny rush (*Juncus acutus*).

TERRESTRIAL RESOURCES

Natural habitat is limited in Mission Bay Park. Most of Mission Bay Park is parkland and maintained beaches. The majority of natural habitat in the Park is part of a preserve system (Figure 3). A 'preserve' designation in Mission Bay Park indicates an area set aside and maintained by the City of San Diego for the purpose of protecting and enhancing wildlife, wildlife habitat, or other natural resources. These preserves include:

- o Northern Wildlife Preserve, including the University of California San Diego's Kendall-Frost Mission Bay Marsh Reserve, located in the northern part of the Bay, east of Crown Point Shores (discussed under Wetland Resources).



TERRESTRIAL HABITAT AND WILDLIFE PRESERVE SYSTEM

Environmental Quality Division

CITY OF SAN DIEGO - PLANNING DEPARTMENT

FIGURE

3

- o Southern Wildlife Preserve located in the San Diego River Flood Control Channel east of West Mission Bay Drive Bridge (discussed under Wetland Resources).
- o Seven least tern nesting sites (FAA Island, North Fiesta Island, Stony Point, Cloverleaf, South Shores, Crown Point Shores, and Mariner's Point).
- o Two salt pan habitat preserves: North Fiesta Island, adjacent and west of the least tern site, and South Shores, adjacent and east of the South Shores least tern site.
- o Coastal Strand/Nuttall's Lotus Preserve south of Sea World and Friars Road intersection.

The following is a discussion of the three terrestrial habitat-types found in the Park: salt pan, coastal strand, and disturbed habitats. Mammals, reptiles, and birds inhabiting or frequenting Mission Bay Park are also discussed.

Salt Pan: Salt pan habitat is actually higher elevation marsh habitat. In Mission Bay Park, salt pan habitat is found within the Northern Wildlife Preserve, on North Fiesta Island adjacent to the least tern nesting site, and on a ten-acre site next to the least tern nesting site between Sea World and the Flood Control Channel (Figure 3). This habitat is drier in nature than the marsh and the ponding that occurs on-site is seasonal. Vegetation growing in a salt pan is tolerant of the high salinity remaining in the soil as the seasonal water evaporates. The dominant species is pickleweed. Other species found include sea rocket (Cakile maritima), and goldenbush (Haplopappus spp.). This habitat is important for the state-listed, endangered Belding's savannah sparrow (Passercalus sandwichensis spp. beldingi) which feeds solely on pickleweed. Some federally-listed, endangered California least terns (Sterna antillarum spp. browni) have been known to nest on salt pan habitat.

Coastal Strand: Coastal strand is a native habitat type which invades unstable habitats. It historically occurs on sandy beaches and dunes along the entire coast of California. Recreational use of coastal beaches in San Diego has virtually eliminated this habitat. Coastal strand habitat in Mission Bay Park is found on the sandy soil in the central portion of Fiesta Island, north of the Over-the-Line Tournament area, in the southern end of Fiesta Island, and in the South Shores area on a seven-acre habitat preserve (Figure 3). Much of the coastal strand habitat found on Fiesta Island is growing on old dredge spoil and is poor quality habitat.

The loose sand, sea salt, and other unusual conditions allow coastal strand species to develop where other plants have difficulty. Plant species found in the central portion of Fiesta Island include bur sage (Ambrosia chamissonis), sand verbena (Abronia maritima, A. umbellata), sand beach evening primrose (Oenothera spp.), Atriplex leucophylla, and the non-native

sea rocket. The Nuttall's lotus (Lotus nuttalianus), historically found in native coastal strand habitat, is not found in central Fiesta Island. This annual species is not officially listed by federal or state wildlife agencies. It does, however, appear on the U.S. Fish and Wildlife Services' listing of taxa under consideration (USFW, 1988). The California Native Plant Society (1988) lists this species as sensitive. Nuttall's lotus grows in the southern end of Fiesta Island and within the South Shores area on hard-packed, non-sandy soil in association with pampass grass (Cortaderia selloana, C. atacamensis), broom baccharis (Baccharis sarathroides) and other invasive species. The only other coastal strand species typically found with Nuttall's lotus is the beach evening primrose. The seven-acre habitat preserve in South Shores is provided for the reestablishment of coastal strand habitat including bur sage, sand verbena, beach evening primrose, and Nuttall's lotus.

Disturbed Habitat: The last remaining terrestrial habitat in Mission Bay Park is ruderal (growing in disturbed areas) upland vegetation. This vegetation has invaded the dredge spoil deposits on Fiesta Island and portions of South Shores (Figure 3). The prominent plant on Fiesta Island is broom baccharis, a native species which is a common invader of disturbed areas. The troublesome pampass grass is also firmly established in the southern end of Fiesta Island. Brome grasses (Bromus spp.) and other weedy species are common in this area. The soil where these plants are established tends to be a harder packed soil, containing more fine particles than the beach sand which characterizes other parts of Fiesta Island. This soil type also is evident on South Shores, where vegetation includes broom baccharis, pampass grass, deerweed (Lotus scoparius), and Myoporum laetum. In some sandy areas on Fiesta Island and South Shores, sea rocket and the spring annual Chrysanthemum coronarium dominate with elements of coastal strand habitat also evident.

Mammals and Reptiles: A very limited number of mammal and reptile species occur in Mission Bay Park due to the limited area of undeveloped land. Five species of mammals have been observed in the Park: desert cottontail (Sylvilagus audubonii), black-tailed jack rabbit (Lepus californicus), California ground squirrel (Spermophilus beecheyi), western harvest mouse (Reithrodontomys megalotis), and house mouse (Mus musculus). Only two reptile species are found in the Park: western fence lizard (Sceloporus occidentalis) and side-blotched lizard (Uta stansburiana). Western harvest mice are found primarily in salt marsh habitat. The other mammal species and two lizard species usually occur in any vegetated, undeveloped area in Mission Bay Park.

Avifauna: Birds comprise the majority of the terrestrial wildlife resources in Mission Bay Park. The Park is located within the Pacific Flyway and, therefore, is an important regional habitat for resting, feeding, and, to a lesser extent, migrating birds. Resident birds also use the available habitat for feeding, resting, and breeding. The most significant habitat areas for birds include the Northern Wildlife Preserve (including Kendall-Frost Marsh Reserve) and the Southern Wildlife Preserve.

Open water areas provide resting and, for wintering ducks, feeding areas. In the Park, wintering ducks concentrate in the coves and shoreline areas around Fiesta Island, and, to a lesser extent, other coves around Mission Bay and some parts of the Flood Control Channel. Upland habitat on Fiesta Island, South Shores, and other areas support a limited number of terrestrial bird species.

The City of San Diego currently is conducting a Park-wide bird survey. The results from the first quarter (October-December) are available in Appendix B of the Mission Bay Park Natural Resource Plan - Technical Appendices (separate document). Prior to this survey, bird censuses were conducted by Reiger and Beauchamp in 1975 for the whole Park and by Sitro (1979) for the Northern Wildlife Preserve.

Birds have three principal activities (feeding, resting and breeding) which require certain habitats. The following discussion identifies which habitats support these activities in Mission Bay for shorebirds (including terns and gulls), waterfowl, terrestrial birds, and sensitive species.

Shorebirds: Shorebirds feed in the intertidal areas of Mission Bay Park exposed during low tides. The mudflats of the Northern and Southern Wildlife preserves expose the greatest area during low tide and provide feeding habitat for large numbers, about 60 percent, of the shorebirds (City of San Diego, 1989). Other areas in the Bay do not have such large numbers due to the narrow intertidal shoreline and high level of human disturbance. The tidal action in the Flood Control Channel is one to two hours behind Mission Bay. This out-of-sync timing allows mudflat exposure at different times, thereby providing an alternative area for shorebirds to use when the other areas become inundated. The most numerous shorebird species are western sandpiper (Calidris mauri), semipalmated plover (Charadrius semipalmatus), black-bellied plover (Pluvialis squatarola), least sandpiper (Erolia minutilla), American avocet (Recurvirostra americana), marbled godwit (Limosa fedoa), willet (Catoptrophorus semipalmatus), killdeer (Charadrius vociferus), dowitchers (Limnodromus spp.), sanderling (Crocethia alba), and red knot (Calidris canutus). The most frequently observed gulls and terns are California gull (Larus californicus), ring-billed gull (Larus delawarensis), Bonaparte's gull (Larus philadelphia), and Forster's tern (Sterna forsteri). The California least tern (Sterna antillarum browni), a federally-listed endangered species, is a visitor in the Park from April to September. The City of San Diego is conducting a foraging study, from May through August 1989. The study results will be inserted in Appendix C of the Mission Bay Park Natural Resource Plan - Technical Appendices, a separate document.

During periods of mudflat inundation, resting areas outside the two preserves are required. Potential resting areas available in Mission Bay Park include the North Fiesta Island salt pan and least tern site, Mariner's Point, other portions of Fiesta Island (Stony Point, eastern and southern shorelines), Crown Point, Riveria Shores, and various other shorelines in the Park.

Only a few shorebirds breed and nest in Mission Bay Park. The most notable nesting species, the California least tern and light-footed clapper rail (Rallus longirostris levipes), are discussed under sensitive species. Another bird nesting in salt pan and salt marsh area is the Belding's sacannah sparrow (Passerculus sandwichensis beldingi). Breeding by shorebirds in the Park is greatly restricted due to the small amount of vacant land with minimal disturbance. Low numbers of black-necked stilt (Himantopus mexicanus), American avocet, and killdeer have nested on the salt pan areas of South Shores. A successful great blue heron (Ardea herodias) rookery is located on South Shores across the Bay from Stony Point.

Waterfowl: Waterfowl are present in Mission Bay Park in great numbers during the winter months. Censuses in Mission Bay indicate the Park supports at least ten thousand waterbirds during winter (Mission Bay Park Shoreline Restoration and Stabilization Project EIR, 1989). The most common species or groups of waterfowl are scaup (Aythya spp.), American wigeon (Anas anserinabys), ruddy duck (Ovyura jamaicensis), northern pintail (Anas acuta), brant (Branta bernicla), bufflehead (Bucephala albeola), northern shoveler (Spatula clypeata), surf scoter (Melanitta perspicillata), gadwall (Anas strepera), cinnamon teal (Anas cyanoptera), green-winged teal (Anas carolinensis), canvasback (Aythya valisineria), mallard (Anas platyrhynchos), and merganser (Mergus spp.). The Northern and Southern Wildlife preserves support the highest concentrations of waterfowl. The large expanse of these areas and the relative isolation provide the best resting and feeding areas during high tides. When low tides limit the open space in these areas, the waterfowl must move to other open water areas in Mission Bay and the Flood Control Channel. These open water areas are most heavily used during nighttime hours and weekdays when human disturbance levels are low. Hidden Anchorage and the open water along South Shores has had substantial waterfowl use in the past; however, the introduction of intensive personal motorized watercraft use has displaced the birds to other areas (Reiger and Beauchamp, 1975).

Eelgrass beds in the open water are especially significant as feeding areas for waterbirds. Most waterfowl species, such as brant, feed on eelgrass. The large number of fish associated with eelgrass beds also attracts fish-eating birds, such as the least tern and California brown pelican (Pelecanus occidentalis californicus).

Waterfowl are not known to breed or nest in Mission Bay Park because they are not present in the Park during their breeding season.

Terrestrial Birds: Three categories of terrestrial bird species occur in Mission Bay Park: species nesting in upland habitats; migrating species, such as raptors, using open areas for foraging; and urban species inhabiting developed areas around the Bay.

Upland species inhabiting areas of ruderal (growing in disturbed areas) vegetation on Fiesta Island and South Shores include house finch (Carpodacus mexicanus), horned lark (Eremophila alpestris), western meadowlark (Sturnella neglecta), mourning dove (Zenaidura macroura), and burrowing owl (Athene cunicularia). Observed on Fiesta Island are loggerhead shrike (Lanius ludovicianus), and golden-crowned sparrow (Zonotrichia atricapilla).

Several raptor species utilize the open, disturbed upland areas as foraging habitat. These species include marsh hawk (Circus cyaneus), red-tailed hawk (Buteo jamaicensis), prairie falcon (Falco mexicanus), and American kestrel (Falco sparverius). The raptor population is limited due to human presence and the limited number of trees or other tall structures which raptors use for perches. The Park supports few, if any, nesting raptors.

Urban species, adapted to and inhabiting developed areas in and around Mission Bay Park include: house sparrow (Passer domesticus), starling (Sturnus vulgaris), and rock dove or pigeon (Columba livia).

SENSITIVE SPECIES

Sensitive species using Mission Bay Park fall into three categories: species officially listed by federal and state wildlife agencies; species listed as candidates for official listing by these agencies; and species considered unique, limited in distribution, or thought to be undergoing regional population decline.

Nuttall's lotus, discussed earlier under Coastal Strand habitat, is the only rare plant listed by the California Native Plant Society (CNPS, 1988) in Mission Bay Park. The City of San Diego has created a seven-acre preserve for this plant along Sea World Drive (Figure 3).

Three endangered bird species (California least tern, Belding's savannah sparrow, and light-footed clapper rail) nest in Mission Bay Park.

California Least Tern: The California least tern is both federally- and state-listed as endangered. As a migratory bird, the least tern is present in Mission Bay Park only during its breeding and nesting season, approximately April to September.

Least terns nest colonially and prefer open areas with sandy, shell substrate and little, if any vegetation. Historically, the least terns have used eleven different sites in Mission Bay Park for nesting. Since the early 1980's, however, least terns have nested every year on FAA Island and on Mariner's Point in 1989. In 1988, 50 fledglings produced from 79 nests were found on FAA Island. In 1989, 30 fledglings produced from 125 nests were found on FAA Island and no fledglings were found from the four nest on Mariner's Point.

The City has maintained seven least tern nesting sites as part of the Mission Bay Park California Least Tern Nest Site Management Team effort (Figure 3).

Five of the seven total nesting sites are designated "permanent" sites and were productive least tern nestings in the past. In 1986, the City entered into a verbal agreement with the U.S. Fish and Wildlife Service to set aside two other nesting sites, Mariner's Point and Crown Point Shores, for a five-year period. Mariner's Point has not supported least tern nesting since 1970 but was included for its nesting potential. Crown Point Shores has never been a least tern nesting site but is considered to have good potential as a site due to its proximity to the Northern Wildlife Preserve.

The original agreement with the Fish and Wildlife Service stated that if least terns have not nested on these sites during the agreed five-year period (1986-1990), sites can be released from the least tern nesting site designation according to the 1986 agreement. Four nests were found on Mariner's Point during the 1989 season; therefore, the Mariner's Point site loses its temporary status and is now a permanent site. This makes a new total of six permanent sites in Mission Bay Park. Crown Point Shores is still a temporary site.

The Mission Bay Park Least Tern Management Team is primarily comprised of representatives from California Department of Fish and Game; U.S. Fish and Wildlife Service; City of San Diego (Planning, Park and Recreation, and Water Utilities Departments); U.S. Army Corps of Engineers; California Coastal Commission, and University of California at San Diego; and the San Diego County Least Tern Recovery Team Coordinator (i.e., Elizabeth Copper in 1989). Each February, the team meets to decide what site preparation to undertake prior to April and the beginning of the next least tern season. Recommended treatments may include clearing of vegetation, importation of new substrate, fence and/or sign repair, installation of a chick protection fence, and placement of roof tiles for chick protection. Human intrusion and predators are ongoing problems and believed to have impacted nesting success. Increased vigilance by City personnel and least tern census takers in addition to keeping existing fences and signs in good repair is expected to help manage the human disturbance element. The City will be aiding the U.S. Fish and Wildlife Service and Department of Fish and Game in a predator control program.

California least terns feed on small fish, such as anchovy and topsmelt, in the upper one to two inches of open water habitats. The actual foraging areas in Mission Bay are unknown. A currently ongoing California least tern foraging study will hopefully indicate tern foraging habitat areas. The first year of the study is scheduled for completion in September 1989. It's hoped to have two more years of survey data to determine least tern foraging locations in Mission Bay Park.

Belding's Savannah Sparrow: The Belding's savannah sparrow, listed as a state endangered subspecies, is a small songbird endemic to California salt

marsh. This songbird typically nests in pure stands of Salicornia in coastal salt marsh and coastal strand habitats. Three locations in Mission Bay Park support Belding's savannah sparrow populations: the Northern Wildlife Preserve; the Southern Wildlife Preserve; and FAA Island, even though Salicornia is limited on the island. The Belding's savannah sparrow feeds on the tender tips of the Salicornia and on insects.

Light-Footed Clapper Rail: The light-footed clapper rail is listed as a federal and state endangered species. These secretive birds nest solely in coastal salt marsh habitat, particularly where cordgrass is abundant. Most of the clapper rails in California in 1980-1984 were concentrated in six marshes: Carpinteria Marsh, Anaheim Bay, Upper Newport Bay, Northern Wildlife Preserve (Kendall-Frost Marsh Reserve), Sweetwater Marsh, and Tijuana Marsh. During the period from 1980 to 1985, the Northern Wildlife Preserve had an average of 16.8 pairs each year making it one of the most significant clapper rail habitats. In 1984, the number of nesting pairs peaked at 24. The Southern Wildlife Preserve supported an average of 1.8 pairs. In 1988, a University of California at San Diego's census found four individuals, probably not pairs, in the Northern Wildlife Preserve and one individual in the Southern Wildlife Preserve.

Other Sensitive Species: In addition, the California brown pelican, a state- and federally-listed endangered species, forage (search for food) in various parts of Mission Bay Park. This species occurs in coastal salt water and open ocean just offshore. The nearest breeding site is the Los Coronados Islands.

Three species found in Mission Bay Park are considered uncommon and declining in population. The burrowing owl inhabits grassland, agricultural land, and coastal areas. In recent years, one or two pairs of burrowing owl have nested in Mission Bay Park on Fiesta Island, the eastern segment of South Shores and near Robb Field. As a result of predation on least tern chicks on FAA Island, predator removal measures were instituted by other agencies in the late 1970's against loggerhead shrikes and burrowing owls on Fiesta Island. The snowy plover (Charadrius alexandrinus nivosos) nests primarily on sandy ocean beaches and around drying margins of lagoons. The only snowy plover nesting recorded since 1975 is a single nest was reported in a University of California at San Diego survey in 1977. The third species, the American avocet is a common winter visitor. In Mission Bay Park, this species nested in low numbers near the sludge beds on Fiesta Island, within the salt pan areas of South Shores, and within the Flood Control Channel. American avocets only recently colonized San Diego County, and the local breeding population are not considered critical to the long-term success of this species.

LAND USE AND RECREATION

Mission Bay Park is a unique and valuable recreational resource because of its size, its urban coastal setting, and its diversity of uses. The Park is over seven square miles and 4,600 acres in size. The Mission Beach and

Pacific Beach communities bound the Park to the west and north, respectively (Figure 1). Interstate 5 is adjacent to the eastern portion of the Park and the southern edge just south of Robb Field, is bordered by the community of Ocean Beach. The Park has about 1,900 acres of land, 2,500 acres of water and 200 acres of preserve. The largest share (45 percent) of the parkland is public park and shoreline. Areas designated for lease development total about 492 acres (25 percent of the parkland) and are focussed primarily in the south, central (Vacation Isle), and western parts of the Bay. There is also a lease area on Tecolote Shores (Hilton Hotel) and the northeastern corner of the Park (De Anza trailer park and resort). The only industrial use in the Park is the City-owned sludge bed operation on south Fiesta Island. These sludge beds are scheduled for removal in 1995. In addition, Government Island is leased to the Federal Aviation Administration (FAA) for the purpose of maintaining airway control facilities. The remaining land is parceled among the 12 wildlife preserves (Figure 3) and vacant land still found in some areas of South Shores and the majority of Fiesta Island.

Much of the popularity of Mission Bay Park is due to the wide variety of available recreational activities. The Park serves more than 12 million people each year (80,000 people on an average peak day). The heaviest recreational use period is from Memorial Day through Labor Day. Areas along the eastern portion of Mission Bay Park tend to be used more intensively due to the proximity to Interstate 5. Land-based recreational activities include bicycling, skateboarding, golf, tennis, bird-watching, boat race viewing, baseball, camping, jogging, volleyball, use of playground equipment, over-the-line, walking, rollerskating, kite-flying, picnicking, sunbathing, and fishing. The 2,500 acres of water in Mission Bay Park support additional recreation such as waterskiing, rowing, fishing, kayaking, yachting, towing inflatables, general power boating, swimming, personal motorized watercraft (i.e., Jetskis), board sailing, sailing, the annual hydroplane and crew races, and regular power boat and sailboat races. Both public and private commercial recreational developments support these activities.

SAND

Mission Bay is located within the Mission Bay Littoral Cell, a 13.5-mile-long section of San Diego coastline located between Point Loma (to the south) and Point La Jolla (to the north). The San Diego River fed new sand material into Mission Bay until about 1946, at which time the river was channelized by the construction of levees. These levees contained the river until its discharge into the ocean, thus substantially reducing the influx of sand into Mission Bay. The current sources for sand within Mission Bay originate from occasional discharges from both Rose and Tecolote creeks, and from erosion of parklands within the Bay. The range in sand size found throughout Mission Bay varies from 0.16mm to 0.4mm, with an average grain size of approximately 0.2mm.

WATER QUALITY

Mission Bay Park's focal point is Mission Bay. Mission Bay is connected to the Pacific Ocean via the riprap-lined Entrance Channel (Figure 2). The Bay is a relatively small and shallow body of water of complex shape. Water depths below the 3.2-square-mile surface area of the Bay range from 7 to 20 feet.

POLLUTANTS

In recent years, Mission Bay experienced a lowering of water quality. In response, the City has undertaken a corrective program. Partially because of its complex shape, flushing and circulation conditions induced by tidal action are inadequate to transport pollutants out of the Bay. This is especially true of the eastern portion of Mission Bay. Runoff carrying pollutants and sediments enters the Bay through storm drains, drainage channels, and other discharge points. Currently, a total of 69 storm drains empty into the Bay. Major watersheds draining into Mission Bay include Rose Creek/San Clemente Creek watershed and Tecolote Creek watershed.

Contaminants, such as nitrates, nitrites, phosphorous, potassium, and heavy metals, have been identified in the Bay water. Many of these are urban contaminants deposited in the Bay via runoff but, apparently, levels are not yet excessively high (Tetra Tech, Inc., 1983).

In addition to urban runoff pollutants, sewage effluent enters the Bay as a result of sewer overflows or storm drainage. Sewage can also enter the Bay directly from boats, recreational vehicles, animals etc. This deposition results in high levels of coliform bacteria which indicate that disease causing organisms may be present. The presence of coliform bacteria is the most serious water quality problem in Mission Bay. Closures of sections of the Bay have occurred on several occasions for public health reasons due to high coliform bacteria levels.

The inability of Mission Bay, once contaminated, to rid itself of pollutants prompted the City to retain Tetra Tech, Inc. Tetra Tech studied the water quality problems in the Bay with particular emphasis on the poorly flushed eastern area. The results of the Tetra Tech Study (Water Quality Control Studies for Mission Bay Park, Tetra Tech, Inc., 1983) indicated that changing the Bay configuration would not appreciably improve flushing and circulation. Tetra Tech recommended constructing a system of interceptors for the major storm drains emptying into the Bay. This interceptor system would divert up to and beyond the minimum capacity of 100 gallons per minute (gpm) of polluted runoff and limited sewage flows from entering the Bay during dry weather. This runoff would be diverted into the sanitary sewage system. At the completion of all phases, this diversion project would intercept approximately 76 drain outlets.

The City has completed the East Mission Bay Storm Drain Interceptor System. The project area included the eastern shore of Mission Bay from Rose Creek Channel to Tecolote Creek Channel. All three phases have been completed. The City is also currently implementing a four-phase sewage interceptor system. Phase 1 is currently under construction in the Crown Point Shores and Sail Bay area. Phase 2 is scheduled for late 1989 for outlets in the Flood Control Channel, Quivera Basin, and Dana Basin. Phase 3 intercepts storm drains along the western shores of Mission Bay. Phase 4 includes storm drains in Ventura Cove, Riveria Shores, and additional interceptors in Rose Creek.

The Flood Control Channel drains the San Diego River watershed and serves as a control for a 100-year flood event. Six storm drains presently empty into the portion of the Flood Control Channel within Mission Bay Park. Occasional pollutant problems from runoff or sewage spills exist in the Flood Control Channel. Maintaining high water quality in the Channel is important due to the presence of sensitive wildlife habitat.

SEDIMENTATION

Rose and Tecolote creeks contain high concentrations of organically rich, fine sediment that aggravates the silting problem in the Bay (Tetra Tech, Inc., 1983). Rose Creek inlet required dredging to remove accumulated silt deposits. The dredging activities, which were necessary to maintain navigability for boaters from Mission Bay Boat and Ski Club, resulted in adverse impacts to marsh and riparian habitats growing on the shallow deposits. Although the impact to recreation will be lessened by the proposed relocation of the Boat and Ski Club to South Shores, the relatively rapid accumulation of silt if left unchecked could present long-term maintenance problems.

Tetra Tech, Inc., proposed two ways to reduce sedimentation problems in Mission Bay. Construction of a desilting basin at the mouth of Rose and Tecolote creeks would trap the sediment previously destined for Mission Bay. The sediment would be removed later from the basin as part of an ongoing maintenance program. The City of San Diego originally planned to address the sedimentation problem from Rose and Tecolote creeks through construction of desilting basins in these watersheds. Construction of a desilting basin, however, would impact the aesthetics of the canyons and do nothing to treat the source of the erosion problem.

The other solution Tetra Tech proposed for the sedimentation problem was construction of various erosion control measures and implementation of a watershed management program. The measures proposed included such items as revegetation of denuded areas and protection of stream banks to reduce the sediment yield from the watershed.

Woodward-Clyde Consultants was retained by the City to study the feasibility and effectiveness of erosion control measures. Erosion processes in Tecolote Canyon include streambank erosion, gully erosion, and

overland erosion. Additional problems in Tecolote Creek include damage to low water crossings, as well as damage to sewer lines. The study identified 41 areas within the watershed where improvements could be made to reduce the amount of erosion occurring in Tecolote Canyon. The implementation of erosion control measures in Tecolote Canyon would reduce the volume of sediment reaching Mission Bay by 40-50 percent by treating the cause of sediment production. A desilting basin would reduce the amount of sediment reaching Mission Bay by treating the effect of sediment production. The study indicates that by implementing a watershed management program as well as the sediment basin proposed by Tetra Tech, the sediment yield could be reduced by approximately 70 percent of its current value. The City of San Diego implemented these recommendations in 1988-1989.

The City had a similar study prepared for the Rose Creek/San Clemente Creek watershed in order to determine erosion problems and sediment yields. Approximately two-thirds of the Rose/San Clemente watershed lies east of Interstate 805 and is federal land (Miramar Naval Air Station). Erosion patterns and problems were found to be uniform throughout the entire watershed. No specific problem areas were identified. Only about seven percent reduction in sediment would result from proposed erosion control measures implemented at a cost of approximately \$900,000. No further action has been taken to date due to the poor cost-benefit ratio.

STATEMENT OF PROBLEM

Planning in Mission Bay Park must consider a variety of land use interests with differing needs and objectives all sharing in Mission Bay Park. These needs and objectives are often in conflict, especially the human versus wildlife element. These interests include commercial development, public recreation, and environmental protection.

LEASE DEVELOPMENT

There is a need for visitor-oriented and marine-related services in Mission Bay Park. Of the 1,900 acres of land in Mission Bay Park, up to 492 acres (25 percent) are available for lease. Approximately 41 acres, of which 39 acres are in the South Shores area, are still potentially available for lease. Existing lease holders, especially hotels, are feeling pressure to expand and/or renovate their facilities to accommodate the growing demand for their services.

PUBLIC RECREATION

Mission Bay Park provides significant aesthetic, educational, and recreational opportunities. There are 27 miles of shoreline, 15.6 miles of which are for public use, and 2,500 acres of open water supporting various aquatic recreation. Continual erosion of the shoreline from tidal surge, boat waves, storms, and wind waves create the potential for visitor and boating accidents due to uneven beaches and shoaling in navigable waters. Safety is the number one priority in public parks. Restoration and maintenance of the Park's beaches to smooth, even slopes and elimination of submerged "holes" which are not visible to waders must be done on a continuous basis. Sand shoals increasing in size must be removed to avoid navigation hazards.

With the population of San Diego and visitors to San Diego increasing, the pressure on existing recreation areas increases. The number of available recreational water-oriented activities and the coastal location make Mission Bay Park a unique recreational resource much in demand. There is constant competition among the wide variety of recreation activities (e.g., sailing, motorboats, personal motorized watercraft) for the available open water.

ENVIRONMENTAL PROTECTION

Federal and state regulations mandate the protection and management of valuable wetland areas and sensitive natural resources. On the federal level, the primary directives are found in the Clean Water Act and the Endangered Species Act. Various sections of these Acts outline specific means for regulating the discharge of dredge and fill materials and the human interaction with federally listed endangered species. Other federal regulations relate to preservation of wetlands, coastal zone management, and flood control.

The State of California has measures in effect to protect state environmental resources. The California Department of Fish and Game Commission has a policy for protection of wetlands and requires measures to protect fish and wildlife. The California Coastal Act also protects wetlands in coastal zones.

The U.S. Army Corps of Engineers, California Coastal Commission, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and California Department of Fish and Game exercise permit and agreement authority over most projects in Mission Bay Park. These agencies are charged with the protection of wetlands and carrying out federal and state regulations previously discussed. Mitigation for impacts to natural resources in Mission Bay Park has been on a project-by-project basis. This piecemeal approach does not ensure that protection of the overall Bay and river systems in the Park are given proper consideration. The agencies have found it increasingly difficult to grant approvals to projects which impact wetlands without a comprehensive plan for Mission Bay Park.

Increasing urban pressures in San Diego County and specifically adjacent to and within Mission Bay Park are impacting available habitat, wildlife foraging, and successful wildlife reproduction. In addition, studies indicate the sea level is rising at a faster rate than in the past due to global warming. Future rises in sea level could further impact coastal habitats, such as salt marsh, which involve tidal interaction. Human, cat, and dog intrusion on habitat preserves has become an increasingly severe problem as preserve areas are of limited space and wildlife has less chance to evade the increasing feline predation, canine disruptions, and human pedestrian and vehicle presence.

CONSTRAINTS AND OPPORTUNITIES

Mission Bay Park offers an opportunity to combine recreational and community planning with the protection and enhancement of biological resources.

The Mission Bay Park Natural Resource Management Plan recognizes the following constraints:

- o The extent of existing development and recreational pressures in Mission Bay Park preclude ever returning all of Mission Bay to the salt marsh it was originally.
- o The primary purpose of this Management Plan is to protect, preserve, and enhance natural resources in Mission Bay Park. Since, however, the Park is in an urban setting, the Park must serve multiple purposes and cannot serve solely as wildlife habitat.
- o Protection of natural resources, as required by state and federal law precludes certain human activities (e.g., construction, dredging, recreation) from certain areas and during certain seasons (e.g., least tern nesting season).
- o Undeveloped land remaining in the Park is limited.
- o Area available for marine habitat mitigation in the Park is extremely limited.

Opportunities for preserving wildlife habitat and maintaining a valuable recreational resource include the following:

- o Comprehensive planning can provide adequate protection measures for natural resources.
- o Wetland habitats can be established in areas where they do not currently exist.
- o Areas of degraded habitat exist which can be restored to improve the overall natural resource system in the Park.
- o Habitat improvement or conversion can be used as mitigation for future losses.
- o The Park and Shoreline land use designation and most recreational activities are relatively compatible with most natural resources.
- o The Park preserve system can be used for educational and research purposes.

LAND USE PROPOSALS

Scheduled future land use projects in Mission Bay Park fall into two categories: City projects and private development projects. Most future development in the Park involves City projects such as roadway improvements, storm drain interceptors, development of park uses, and shoreline stabilization and maintenance. Private development proposals are less extensive involving primarily refurbishing and/or expansion of existing facilities within a leasehold and the approximately 41 remaining acres are available for lease. For both City and private development projects, compliance with the Mission Bay Park Natural Resource Management Plan and mitigation of impacts to natural resources will be the responsibility of the developer. Mitigation programs should incorporate the guidelines set forth in this Plan, as appropriate. The following list includes only those projects known at this time. Future additional projects will undoubtedly be initiated during the life of this Plan.

CITY PROJECTS

1. Dock refurbishment at De Anza Cove and Dana Landing (Park and Recreation Department) - in design.
2. Harbor patrol dock replacement at Hospitality Point (Park and Recreation Department) - in preliminary planning.
3. New boat ramp at the De Anza Cove (Park and Recreation Department) - in design.
4. Sail Bay continuing improvements: bicycle and pedestrian walkway and landscaping between Verona Court and Moorland Drive (Park and Recreation Department) - in design.
5. New comfort station at Santa Clara point (Park and Recreation Department) - out for bids.
6. Comfort station replacement at Ventura Cove and De Anza Point (Park and Recreation Department) - in design.
7. Small children's play area at Santa Clara Point (Park and Recreation Department) - budgeted for fiscal year 1990.
8. Shoreline Restoration and Stabilization Project (Park and Recreation Department) - master plan and environmental impact report in approval process.
9. Open channel drainage replacement with drain pipe at southern Crown Point Shores (Park and Recreation Department) - begin construction in September 1989.
10. Replace comfort stations at Bahia and El Carmel points and Crown Point Shores (Park and Recreation Department) - in design.
11. South Shores Development: nine-acre Bay and related development (Park and Recreation Department) - construction interrupted; project is being rebid.
12. South Shores Development: ten-acre seasonal wetland to be constructed on Fiesta Island as mitigation for South Shores development (Park and Recreation Department) - in design.
13. Sail Bay continuing improvements: pedestrian bridge across Briarfield Cove (Briarfield Boardwalk) to connect sidewalks (Park and Recreation Department) - in design.
14. Sail Bay Mitigation Program: reestablishment of offshore eelgrass beds (Park and Recreation Department) - second year of five-year monitoring program.
15. Mission Beach Drain Improvements (Engineering and Development Department - Storm Drains) - in contract negotiation.
16. Sunset Cliffs Boulevard Bridge Bike Path (Engineering and Development Department - Streets) - design review.
17. North Ingraham Street Bridge widening (Engineering and Development Department - Streets) - under construction.
18. Offshore Breakwater Project (City Manager's Office with U.S. Army Corps of Engineers) - project under consideration.
19. Sewer Pump Stations 11, 14, 15, and 16 redevelopment (Water Utilities Department) - in design.
20. Mission Bay Storm Drain and Sewage Interceptor System (Water Utilities Department) - in design.
21. Sewage Management Master Plan (Water Utilities Department) - in design.
22. Sidewalk along street adjacent to Northern Wildlife Preserve (Park and Recreation Department) - in design.
23. Handicapped play area at Tecolote Shores (Park and Recreation Department) - in design.
24. Tecolote Shores public parking lot adjacent to handicapped play area (Park and Recreation Department) - in design.
25. Fence replacement and viewing platforms at Northern Wildlife Preserve (Park and Recreation Department) - in design.

26. Signs at wildlife preserves (Park and Recreation Department) - in design.

PRIVATE DEVELOPMENT PROJECTS

1. Bahia Resort: Complete redevelopment of resort on existing leasehold - in design.
2. Princess Resort: Expansion of existing facilities within leasehold, possible future expansion of marina facilities and docks - in design.
3. De Anza Trailer Park Redevelopment: replacement of trailer park with hotel/shopping/recreation complex, may include a bridge joining Pacific Beach Drive across Rose Creek - in design.
4. Dana Inn Redevelopment (Dana Basin): waiting for City Council approval prior to beginning construction.
5. Carmel Point Rowing Center: new rowing facility, includes bulkhead - in design.
6. Youth Aquatic Facility: boat launch on Fiesta Island - in design.
7. Sea World: marina expansion - unknown status.
8. Seaforth Sportsfishing (Quivira Basin): redevelopment into hotel/restaurant complex - in design.
9. Marina Village (Quivira Basin): redevelopment - under study.
10. Catamaran Hotel: extension of dock - in design.

BEACH MAINTENANCE

The City of San Diego needs to maintain Mission Bay Park shoreline areas for safety, sanitation, and shoreline stabilization reasons. Three types of beach maintenance activities occur in Mission Bay Park: grooming and cleaning of dry sand areas; removal of intertidal debris; and smoothing of intertidal sand.

Beach areas in the Park are groomed to smooth irregularities in the sand. The sand is also sifted through large sieves to remove trash and broken glass. These activities occur in the dry sand on a regular basis above Mean Higher High Water (MHHW). During the summer when human activity is high the sand is cleaned and groomed on a weekly basis. Cleaning and grooming occur less often, about twice a month, during winter months. The trash is taken to an area on Fiesta Island until enough is collected for hauling to a dump site.

Debris, including marine plants and animals washed ashore, is removed from the intertidal area of the beaches about twice a month and after a storm event. Removal is done after an extreme high tide occurs and the debris is washed to the highest elevation. Equipment enters the intertidal area only to move the debris out of the intertidal zone. The decaying marine plant and animal debris is brought to a site away from the public on Fiesta Island where it is allowed to decay. Any sand which can be retrieved is stockpiled for later use in replenishing sand beaches where erosion or storm events have depleted the beach.

Regular smoothing of cliffs created by storms, tidal action and, boat waves in the intertidal area is not currently done in Mission Bay Park. Such a maintenance program, however, is proposed in the Mission Bay Park Shoreline Restorative and Stabilization Project Plan to minimize erosion and excessive on Mission Bay beaches. Without regular maintenance to make beach slopes smooth and consistent, the tidal action would do its own smoothing of shoreline irregularities, carrying much of the sand into the Bay. If the water does the smoothing instead of beach equipment, sand is lost and cliffing begins to occur causing erosion and accretion problems.

Occasional beach replenishment is needed in Mission Bay Park. The additional sand is needed after a storm event has carried away an existing beach. Currently, additional sand is also placed on some beaches where sand has been lost by erosion before summer to accommodate the increase in visitor activity. The Mission Bay Park Restoration and Stabilization Project Plan proposes softscape methods which would reduce the frequency of need for beach replenishment. California Coastal Commission and U.S. Army Corps of Engineers permits are required for beach replenishment activity.

Some unavoidable accretion occurs in the Bay which can only be removed by periodic dredging. The Park and Recreation Department, Coastal Division, is proposing to undertake dredging in six areas of the Bay to remove submerged navigable hazards and accretion zones. Navigable hazards are present in Fisherman's Channel, west of Ingraham Street Bridge, and in the Entrance Channel, between South Vacation Isle and Dana Basin. As mudflats in the Northern Wildlife Preserve accrete more material, they extend further into the Bay. To avoid navigational problems, the City proposes to dredge the outer boundary, as defined in the attached bathymetry report, of the Northern Wildlife Preserve as needed to maintain the existing boundary. (Appendix A).

DEVELOPMENT GUIDELINES

The following guidelines and requirements are provided for the protection of sensitive natural resources. These requirements and guidelines should be incorporated into impact analysis and mitigation planning for any proposed project in Mission Bay Park, including City and private developer sponsored projects.

CALIFORNIA LEAST TERN

As a federally-listed, endangered species, the California least tern and its habitat are protected by the Endangered Species Act of 1973. The requirements listed conform with the Endangered Species Act to protect the least tern during its breeding season in Mission Bay Park. Limitations on human activity on or adjacent to designated least tern nesting sites are necessary for maintaining the attractiveness of the sites for breeding and nesting. Maintenance of good water quality will ensure that the least terns will be able to forage in Bay waters. Least tern nesting sites are designated on Figure 3.

1. No in-water construction or dredging will be permitted in Mission Bay or the Flood Control Channel from April 1 through September 15, the least tern breeding season. If in-water construction is required during this time, exceptions are possible, upon approval of the City, California Department of Fish and Game, and U.S. Fish and Wildlife Service. Any exception would have to meet the following criteria to preserve least tern nesting and foraging: use of silt curtains or similar devices around in-water construction activity; use of noise reduction or low noise equipment; and use of timing and location restrictions on activity to avoid interfering with breeding sites or major least tern foraging areas.
2. No direct impacts to permanently designated least tern nesting sites are permitted. The only exception is the Cloverleaf site, which may be converted in the future to landscaping if no least terns use the site. This land use change would require the approval of a mitigation replacement site by the resource agencies.
3. The following buffer zones for each least tern nesting site will be free of new structures with heights of over six feet, including fencing around the site. This will keep raptors from using a high vantage point to prey on least tern chicks.

Permanently Designated Sites

North Fiesta Island - 150 feet

FAA Island - 150 feet

Stony Point - 150 feet

South Shores - 150 feet

Cloverleaf - 100 feet

Mariner's Point - 150 feet

Temporarily Designated Sites

Crown Point Shores - 100 feet

4. Special Use Permits for activities on Mariner's Point will require that the 150-foot buffer zone north of the least tern nesting site be free of all formal activities and activity structures (e.g., tents, stages, bands).

EELGRASS HABITAT

Eelgrass is important to the Mission Bay ecosystem as food, shelter, and nursery for many marine organisms and fish. Many of these animals provide food for larger marine life and birds. Eelgrass habitat in southern California is rapidly disappearing due to in-water development and increasingly poor water quality. Project impacts to eelgrass are direct (e.g., construction activity) and indirect (e.g., shading from structures or boats). Efforts must be made to maintain the eelgrass habitat available and improve water quality.

1. No net loss of eelgrass meadows is acceptable. A 1:1 replacement ratio of similar density is required for impacts to eelgrass habitat as delineated in the 1988 survey (Figures 2A-2F).
2. Mitigation is required in Mission Bay itself, if the impact occurs in Mission Bay. Mitigation is required in the Flood Control Channel or Mission Bay if the impact occurs in the Flood Control Channel.
3. New sand beaches below Mean Lower Low Water (MLLW) should be replanted with eelgrass whenever the slope is changed by maintenance activities and eelgrass beds are impacted.
4. Replanting efforts are best during low energy tides (late summer - early fall).
5. Any construction or dredging project in Mission Bay or the Flood Control Channel will buoy off areas from which it is restricted prior to the start of activity. This is to limit the extent of direct impacts to existing eelgrass.
6. Any construction or dredging project disturbing the substrate in Mission Bay or the Flood Control Channel will use silt curtains or

similar devices around disturbance areas. This will limit any adverse impact to water quality to the immediate construction area; thereby, reducing impacts to eelgrass and foraging birds.

7. Eelgrass surveys for a project site will be required before and after construction to determine the extent of impact. Mitigation requirements for eelgrass will be based on the amount of actual loss.
8. A mitigation program, including maintenance, would be required for impacts to eelgrass habitat. Requirements for this program are discussed under "Development Responsibilities," Page 48 of this plan.

MARINE AND TERRESTRIAL HABITAT

Salt marsh, salt pan, coastal strand, and open water habitats are important in a diversified, well-balanced wetland ecosystem. Each of these habitats provides for the needs of specific species. The remnants of salt marsh, salt pan, and coastal strand habitats in Mission Bay Park are especially important as these habitats are rapidly disappearing from California's coast. Without the habitat, the plant and animal species indigenous to that habitat will not be able to survive.

1. No net loss to any salt marsh, salt pan, coastal strand associated with a sensitive species, or open water habitat will be permitted without replacement of equal or greater habitat value.

The healthy salt marsh found in the Northern Wildlife Preserve is the last remnant of the once extensive salt marsh in Mission Bay. The salt marsh in the Southern Wildlife Preserve is also flourishing; however, because of its location in a Flood Control Channel, a high flood event could damage portions of the marsh. Because these salt marsh areas are extremely sensitive to disruptive activities, no direct impact is permitted, unless required for protection or enhancement of the marsh. Should protection or enhancement measures become necessary, they should be done outside of least tern, clapper rail, and savannah sparrow nesting seasons and incorporate measures to contain and reduce the impact. Any proposed measure for the Northern Wildlife Preserve must be approved by the University of California at San Diego and the City joint management committee as well as appropriate resource agencies. Any measure proposed in the Southern Wildlife Preserve requires City and appropriate agency approvals.

2. Buffer zones serve a biological function by providing a separation and screening of wildlife habitat from human activity associated with human development. Land use within buffer areas will be limited to bikeways, walkways, and passive recreation, such as nature study, viewing, and picnicking. Buffer areas should be planted with appropriate vegetation native to southern California and compatible with the adjacent habitat. Measures should be taken to keep run-off from entering habitat reserves.

Buffer zones around terrestrial habitats in Mission Bay Park which exclude any development are as follows: salt marsh - 100 feet; salt pan - 50 feet; and coastal strand - 50 feet.

The only exceptions to buffer zone provisions are signs, buoys, boundary fences, and educational or research-oriented structures with City approval on a project-by-project basis. City approval will include environmental review.

DREDGING

Two types of dredging affect open water habitat: maintenance and construction dredging. Maintenance dredging primarily removes navigational hazards or retrieves sand accumulating as sand spits or accretion zones along the shoreline. The City has identified five areas that require periodic maintenance dredging (Figure 4). (For additional information on these areas, refer to the Mission Bay Park Shoreline Restoration and Stabilization Project Plan). Construction dredging is required for projects that require pilings or additional depth clearance.

In addition to requirement number 1 under "Least Terns" and requirement numbers 1, 3, 4, 5 and 6 under "Eelgrass," the following are required for proposed dredging in Mission Bay and the Flood Control Channel.

1. Dredging impacts to marine habitat will require a 1:1 replacement ratio. Impacts from maintenance dredging will require a one-time mitigation for lost resources. Subsequent maintenance dredging for the original location, which has already mitigated the impact, will not require additional mitigation each time it is dredged.
2. All dredging activities should comply with permit conditions of the U.S. Army Corps of Engineers, Regional Water Quality Control Board State Lands Commission, and California Coastal Commission. Permits issued by these agencies may specify additional requirements for timing of in-water construction, spoil disposal methods, and dredge sediment material testing.
3. Sand of good quality retrieved in dredging operation will be stockpiled on a non-sensitive, designated site on Fiesta Island upon approval of the City. This sand will be used later in replenishment if it is of the proper grain size for beach stabilization. If room is not available on Fiesta Island, other arrangements for dredge spoil disposal will need to be made and approved by the City and other appropriate resource agencies.
4. If the sand is determined by a qualified expert to be unclean, to contain toxic material, or to be of poor quality, it will be transported to a permitted landfill. Sand containing toxic material will be taken only to a landfill qualified to handle toxic material.
5. Dredging of the Northern Wildlife Preserve outer boundary as defined on the bathymetry map (Appendix A) is permitted if in the future the outer

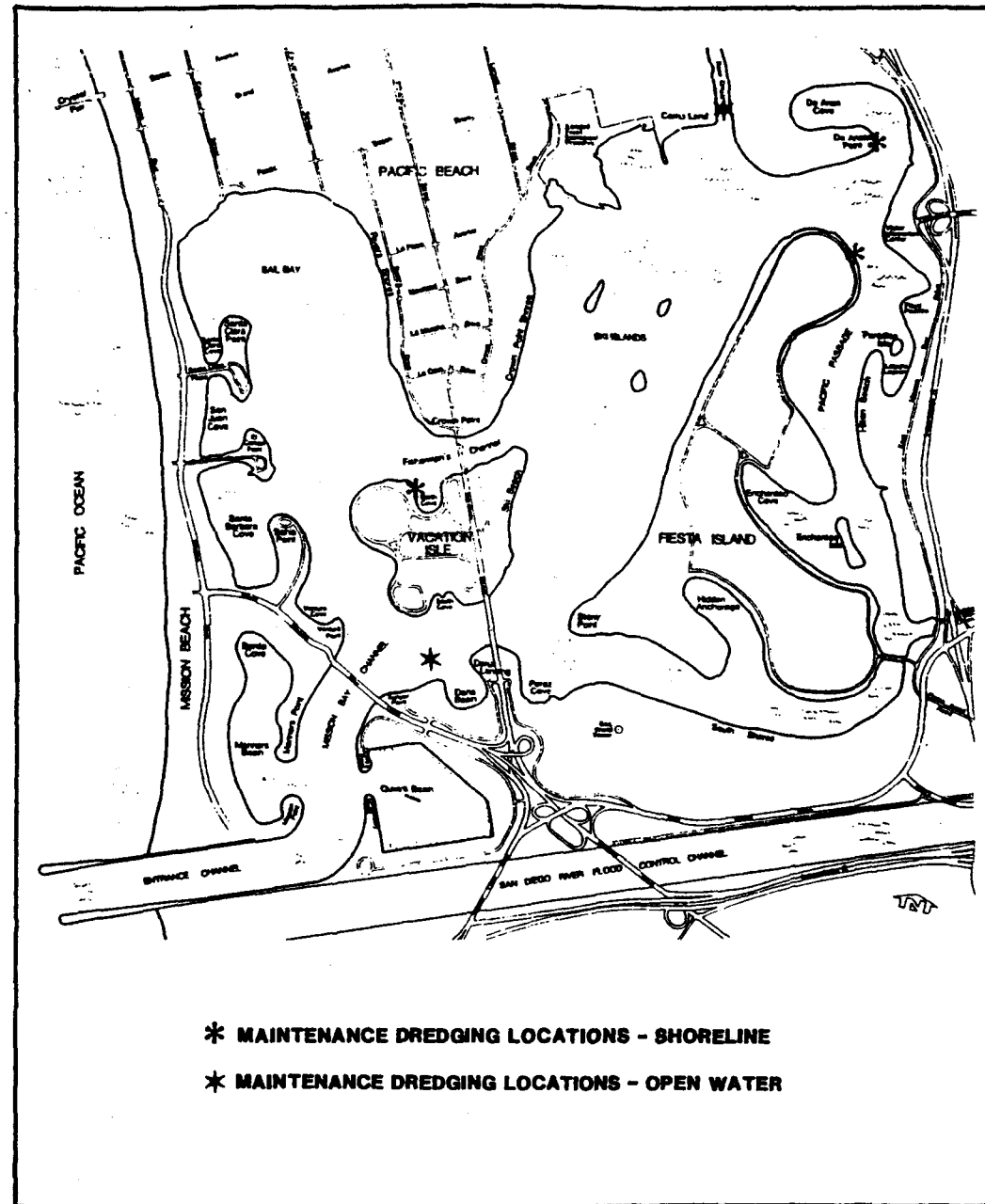
boundary moves further into the Bay. The future dredge line will be outside the minus ten mean sea level (MSL) contour to preserve as much

eelgrass and marsh habitat as possible. Spot elevation checks will be done every two years at nine locations along the proposed dredge line, outlined on the bathymetry map. These elevation checks will be the basis for deciding if the boundary needs dredging. Impacts of the dredging operation will be determined and methods used to minimize impacts (e.g., noise reduction, silt curtains, etc.). Timing is especially important to avoid disturbance to nesting birds. Impacts to eelgrass will need to be mitigated the first time the area is dredged but not for subsequent maintenance dredging at the same location.

6. Potential erosion and sedimentation control measures for Rose Creek have been researched (Woodward-Clyde, 1986). This study concluded that no action by the City could eliminate more than seven percent of the sedimentation problem and those measures would have substantial environmental impacts. Dredging of Rose Creek, therefore, is still a necessity for flood control. Dredging of the Rose Creek area within Mission Bay Park will be allowed from Pacific Beach Drive south to the Bay for flood control. Rose Creek will not be dredged north of Pacific Beach Drive to protect mudflat and salt marsh habitats occurring further upstream. Soundings will be taken to determine bottom depths and the need to dredge will be based on low-tide boat draft requirements. Impacts from dredging operations will be determined and methods used to minimize impacts (e.g., noise reduction, silt curtains). Timing is especially important to avoid disturbance of nesting birds. Mitigation of impacts to eelgrass will be required the first time the area is dredged but not for subsequent maintenance dredging for the same location.
7. Sand reclamation and beach grooming and recontouring activity in areas adjacent to eelgrass beds will not require mitigation if silt curtains are utilized to avoid the secondary impact of drifting material and reduced water quality.

BEACH MAINTENANCE

Grooming and cleaning activities (smoothing and removing trash from the sand) in the dry sand above Mean Higher High Water (MHHW) will not require mitigation. Removal of debris washed ashore will not require mitigation if the activity occurs above Mean Lower Low Water (MLLW), removes as little sand as possible, and follows responsible construction practices. Smoothing tidal cuts in intertidal areas will not require mitigation if it is done above MLLW, above eelgrass beds, does not add sand, and follows responsible construction practices. Beach replenishment should be done only to replace sand lost in a storm event or to dress a beach prior to the summer visitor season. The City will not require mitigation for beach replenishment (the adding of sand in depleted areas) if it is done above MLLW, above eelgrass beds, and follows responsible construction practices. Beach replenishment requires an Army Corps of Engineers permit and a California Coastal Commission permit.



MAINTENANCE DREDGING LOCATIONS

Environmental Quality Division
CITY OF SAN DIEGO · PLANNING DEPARTMENT

FIGURE

4

WATER QUALITY

1. All erosion and potential erosion areas should be landscaped, with the exception of the cliffs along Riveria Shores where irrigation runoff would aggravate the problem.
2. Irrigation systems should be designed and properly maintained to avoid the creation of erosion.
3. Dry flow interceptor systems should be maintained and operated to minimize dry weather surface contaminants from entering Mission Bay.
4. Runoff should be directed away from the Bay wherever possible.
5. Every effort should continue to be made to improve water quality for preserve areas and the Bay. The University of California Natural Reserve System and City of San Diego joint - management of the Northern Wildlife Preserve would include efforts to regularly monitor water quality in the Preserve.
6. Future changes to stream flows (instream discharge) in the San Diego River Flood Control Channel, Rose Creek, or Tecolote Creek should consider the natural resource management policies in Mission Bay Park.

MITIGATION OPTIONS AND GUIDELINES

TERRESTRIAL HABITAT MITIGATION

Mitigation options for impact to or loss of salt marsh, salt pan, and coastal strand habitats are limited to the creation of new habitat. Mitigation for wetland habitat requires special treatment to ensure the habitat value is offset. Some special requirements are listed below to maximize wildlife value of the newly created habitat. Additional requirements may be added should they be necessary for creation of a viable wetland habitat.

1. The replacement ratio for salt marsh habitat will be determined project-by-project based on the type and degree of indirect impact to the marsh. No direct impact or loss of salt marsh is permitted except as required for protection or enhancement of the marsh, as stated on Page 34.
2. The replacement ratio will be 1:1 for salt pan habitat within Mission Bay Park.
3. Assessment of impacts to coastal strand habitat will include quality of the habitat and identification of any sensitive species. Mitigation for loss of any sensitive species could include replacement at up to a 1:1 ratio.
4. A variety of habitat types should be created to encourage diversity of species.
5. Vertical and horizontal plant diversity should be established.
6. An irregular rather than straight shoreline or border should be created between habitat types to maximize the edge effect.
7. Wildlife areas of concentration should be created where vegetation is especially dense and extensive.
8. Only appropriate plants native to coastal southern California should be used in revegetation.
9. Human impacts should be considered in designing revegetation (e.g., use of thorny shrubs to limit access to sensitive areas).
10. Temporary irrigation, if necessary, should be provided to help establish new vegetation.
11. Any non-native or invader species should be removed on a regular basis.

12. The revegetation site should be monitored regularly and appropriate recommendations should be made for enhancing revegetation efforts.

EELGRASS HABITAT MITIGATION

Mitigation options for impact to or loss of eelgrass habitat is limited in Mission Bay Park. Mitigation banks seem the most economical and viable means of mitigating eelgrass impacts for greater losses. Mitigation banks actually allow for more habitat to be created than is currently required. This allows impacts from future projects to be mitigated without additional habitat creation. A project would "purchase" the area of eelgrass habitat needed to mitigate its impact from the developer of the bank. This is assuming the bank has available the acreage that is required and that the project wishing to purchase the mitigation habitat meets the following criteria: the project is water oriented; the project can only be built in or over the water; and the project is a permitted use. Available mitigation options are as follows:

1. New eelgrass beds could be created by elevating areas of the Bay or Flood Control Channel bottom to an appropriate depth for eelgrass growth.
2. Elevation of portions of smaller islands such as Enchanted Isle could be reduced, to create additional habitat.
3. Three options for mitigation and/or mitigation banks are:
 - a. The top of East Ski Island and/or West Ski Island could be removed to form an underwater bench at minus 5 or minus 6 Mean Lower Low Water for eelgrass planting.
 - b. Eelgrass could be planted in the South Shores embayment currently under construction.

This assumes that the Sail Bay eelgrass mitigation has been satisfactorily met in the area designated in Sail Bay. If additional mitigation area is needed to satisfy the Sail Bay mitigation requirement, that mitigation has priority for use of the South Shores embayment.
 - c. An embayment could be created in Fiesta Island and planted with eelgrass. This area should be on the western shore of the Island west of the road, where the current sludge beds are (Figure 5), where the new habitat would benefit the most from tidal action and good water quality.

ENHANCEMENT GUIDELINES

The guidelines subsequently outlined are provided for the enhancement and protection of natural resources in Mission Bay Park. The City is responsible for implementing these measures.

CALIFORNIA LEAST TERNS

1. The annual Mission Bay California Least Tern Management Program, a joint-agency effort, should be continued. This Management Team will continue to be comprised of representatives from U.S. Fish and Wildlife Service, California Department of Fish and Game, California Coastal Commission, U.S. Army Corps of Engineers, City of San Diego Park and Recreation Department and Water Utilities Department (until sludge beds are renewed from Fiesta Island), and San Diego County Least Tern Recovery Team Coordinator (e.g., Elizabeth Copper in 1989). Other least tern experts (e.g., private organizations or citizens) may be included. Every year, prior to March, the Management Team will meet to discuss that year's per site preparations for the upcoming least tern season. Preparations may include, but are not limited to Items 2, 3, 4, 5, and 6 listed below.
2. Signs, gates, and fences at least tern nesting sites (Figure 3) should be kept in good repair. New signs should be added and fencing added or replaced as needed.
3. Vegetation should be removed, the site graded, and new sandy, shell substrate should be added as needed.
4. Chick protection devices, such as a chick fence or roofing tiles for cover, should be added when needed.
5. U.S. Fish and Wildlife Service and California Department of Fish and Game should be aided in predator control efforts for nesting sites, especially on Fiesta Island and at South Shores.
6. Decoys should be placed by resource agencies on sites, deemed by the Least Tern Management Team to be safe (i.e., relatively free of predators), to attract least terns to the site(s).
7. One person once a week for sixteen (16) weeks should be provided to aid agencies in monitoring least tern nesting sites during the least tern breeding season.
8. Various City departments (e.g., Lifeguard Services, Police Department) should be alerted on the need to enforce keeping intruders off least tern sites.

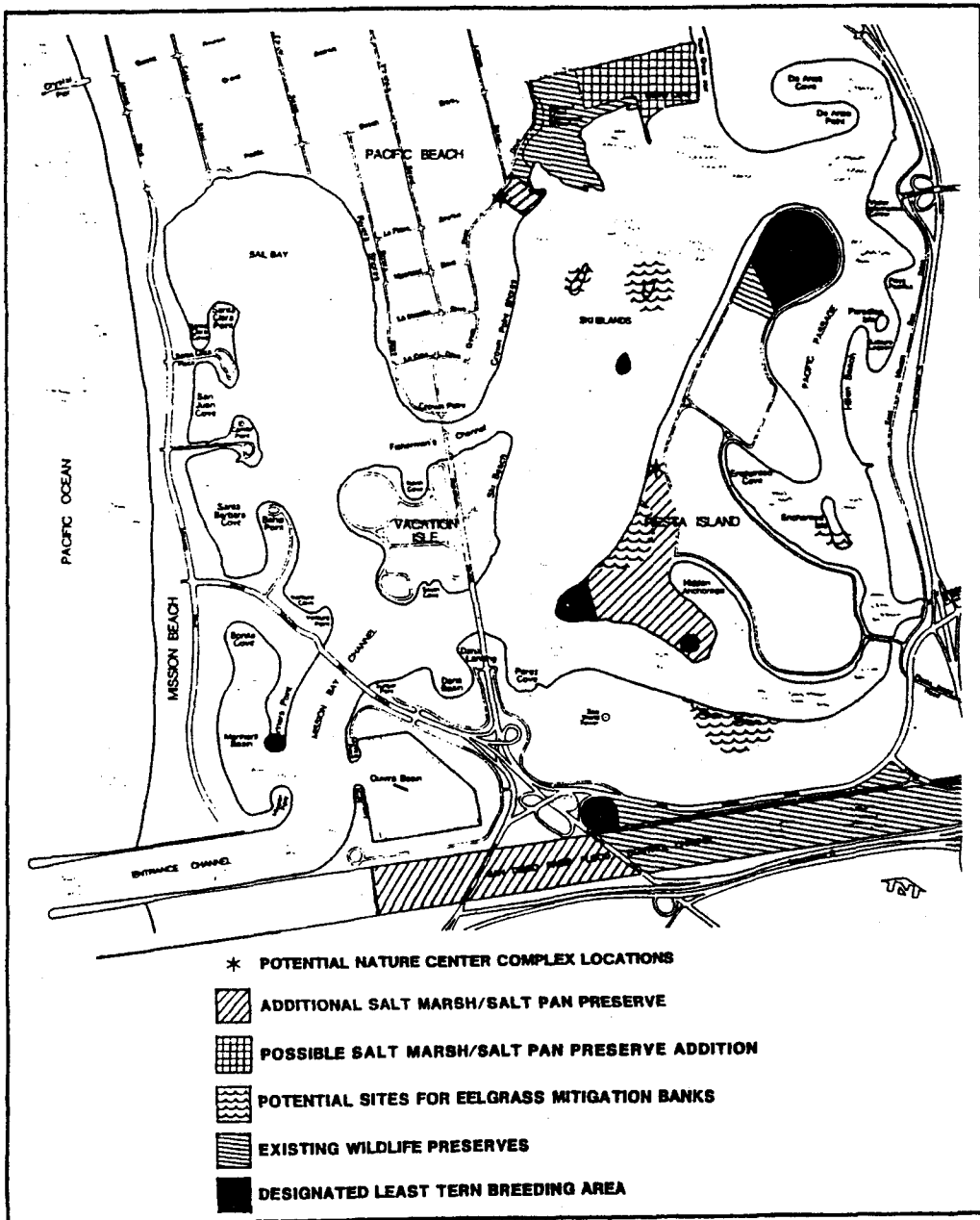
qualified wildlife biologist with experience in successful marsh/wetland rehabilitation.

EXPANSION OF PRESERVE SYSTEM

The preserve system in Mission Bay Park allows the protection and enhancement of sensitive ecological habitats and natural resources. Except for preserve maintenance, only limited educational and research activities are allowed within a Mission Bay Park preserve. The following recommendations would further protect the existing natural resource system in the Park by providing additional habitat base. Figure 5 illustrates proposed additions to the preserve system. A larger habitat base allows an expansion of population necessary to counterbalance the negative impact of a progressively urban influence and future threat of rising sea levels. Expansion of salt marsh upland habitat is important for balancing the negative effect of potential future rises in sea level. Rising sea level would result in existing intertidal areas becoming subtidal areas; thereby, creating a need for existing upland areas being available to become future intertidal areas. These measures do not conflict with existing recreational use or leaseholder activities in Mission Bay Park.

1. The entire Flood Control Channel should be considered part of the Southern Wildlife Preserve from Interstate 5 west to the point south of the east edge of Hospitality Point (see Figure 5). Waterfowl and shorebirds, in addition to least terns, use this area of the Channel regularly to hunt for food (forage). To minimize disturbance to birds, especially wintering waterfowl, inhabiting the Flood Control Channel, only non-motorized boats will be allowed to use the Channel west of Ingraham Street Bridge from April through September. Obtaining a park use permit from the Park and Recreation Department, Coastal Division, will be required prior to use of the Channel. The Coastal Division will instruct permit applicants on use restrictions and will limit permits to ten for any given day. Signs will be posted to delineate the new boundaries of the Southern Wildlife Preserve. Fishing is allowed in the Flood Control Channel west of Sunset Cliffs Boulevard. Wading in the Channel to fish is permissible only from Dog Beach.
2. The Crown Point least tern nesting site should be made available for salt marsh/salt pan rehabilitation. This is an excellent opportunity to expand one of the most productive salt marshes in the state and the habitat for two other endangered birds (light-footed clapper rail and Belding's savannah sparrow). The use of this site is contingent upon the lack of least tern nesting on the site through the 1990 season. If no nesting occurs by September 1990, the City would have the prerogative of converting this site to wetland habitat. During the fund acquisition and design phase of the marsh restoration, the Crown Point site would continue to be actively managed as a least tern nesting site. If least terns have nested prior to the beginning of restoration, a portion of the site would be retained as permanent least tern nesting habitat. If least terns have not nested, the entire site could be restored to wetland habitat; however, consideration will be given to retaining a portion of the restored wetland area for least tern nesting. The revegetated salt marsh and salt pan habitat would be applied as mitigation credit for any future impacts to the natural habitat. The rehabilitation plan for this site should be designed by a

3. The 1978 Mission Bay Park Master Plan for Land and Water Use states that "consideration should be given to adding this area [Campland lease] to the Northern Wildlife Reserve upon termination of the lease [2017]". The Natural Resource Management Plan supports consideration of an eastern expansion of the Northern Wildlife Preserve to include part or all of the 15-acre Campland lease area. From a resource management perspective, eastern and western expansion of the Northern Wildlife Preserve salt marsh has a high priority. Such expansion would broaden the base for all of Mission Bay Park's natural resources in the face of urban pressure and future threat of rising sea level. Expansion of such a productive salt marsh as the Northern Wildlife Preserve is a unique opportunity in an area of urban development. The proposal to expand the Preserve to the west is dependent on least tern nesting activity and only a portion may be available for marsh expansion. Marsh expansion eastward should be considered, therefore, with other proposed options for future use of the Campland lease area. Consideration should also be given to the acquisition of the two-acre Frost property adjacent to the Preserve for wetland expansion by either the University of California Natural Reserve System or the City of San Diego.
4. The Cloverleaf least tern nesting site is a permanent site which has not been used since 1975, except in 1982. It is surrounded by high traffic roads, is less than an acre in size, and is difficult to maintain and monitor. For these reasons, it is recommended that the Cloverleaf site be released from a permanent nesting site designation and be returned for park use, such as landscaping. To mitigate the loss of the Cloverleaf site, one of the other existing permanent least tern nesting sites would be expanded by the approximate size of the Cloverleaf site.
5. The area (approximately 110 acres) currently supporting sludge beds on Fiesta Island west of the road, should be considered for a new preserve. A variety of habitats, such as salt marsh, salt pan, coastal strand, a least tern nesting area(s), and a small embayment planted with eelgrass would be created within the new preserve. The rehabilitation plan for this site should be designed by a qualified wildlife biologist with experience in successful salt marsh/wetland rehabilitation. This Fiesta Island Wildlife Preserve would serve as a mitigation "bank" for the habitat types created. The bank would provide mitigation credit for future projects. This mitigation credit system is discussed later under Mitigation Options.
6. Should additional least tern habitat be needed in the future because of increased least tern populations, overcrowding of existing sites, or conversion of the Cloverleaf site to park use, the Stony Point or North Fiesta Island least tern sites could be expanded. Areas for future additional least tern nesting sites could be West Ski Island or part of the new wetland preserve proposed on Fiesta Island that could be converted to least tern nesting habitat. Another possible site is the coastal strand habitat preserve (Figure 3) where least tern nesting would be a compatible use.



NORTHERN WILDLIFE PRESERVE

1. More buoys should be installed to discourage boats and people from entering the Northern Wildlife Preserve from the Bay.
2. The existing fence should be replaced and the interior fence separating City property from University of California property removed.
3. University of California at San Diego is encouraged to continue their efforts to clear mangroves from the Preserve.
4. Viewing platforms should be built at several locations around the perimeter of the Preserve.
5. Pampass grass should be removed wherever possible, as it is an introduced species and provides habitat for predators that feed on least tern chicks.
6. A joint-management team comprised of a University of California, San Diego, representative and a Park and Recreation Department representative will meet regularly to discuss, evaluate, and attempt to solve preserve management problems. This team will also work cooperatively to maintain and/or expand the preserve data base and monitoring efforts.
7. A predator control program jointly sponsored by the City of San Diego and the University of California Natural Reserve System should be implemented for the protection of native, sensitive, and endangered preserve inhabitants.

FIESTA ISLAND

1. Pampass grass should be removed.
2. Where appropriate, native vegetation should be used in landscaping.

FLOOD CONTROL CHANNEL AND SOUTHERN WILDLIFE PRESERVE

1. Continue the removal of pampass grass from the Flood Control Channel banks to maintain flood protection as well as to eliminate an ecologically undesirable plant.
2. Interpretive and informational signs will be placed along the boundaries of the Southern Wildlife Preserve.

MISSION BAY PARK

Landscaping along preserve buffers and in non-public use areas should emphasize native plants.

FIGURE

5



PROPOSED WILDLIFE PRESERVE ADDITIONS

Environmental Quality Division
CITY OF SAN DIEGO · PLANNING DEPARTMENT

EDUCATION/RESEARCH

The natural habitat preserve system in Mission Bay Park provides wonderful educational and research opportunities. The following measures are designed to utilize some of those opportunities in a wise, nondisruptive manner.

1. Standard informational, educational, and boundary signs will be developed for least tern, salt marsh, salt pan, and coastal strand preserves.
 2. Signs will be strategically placed for maximum benefit and designed or placed to avoid use by foraging raptors.
 3. The data base for Mission Bay Park will be kept current. The data base will be updated by January of every year. City-sponsored surveys include:
 - a. Eelgrass/underwater habitat survey - every three years using the same methodology as described in the scope of work provided in Appendix A of the Mission Bay Park Natural Resource Plan - Technical Appendices document.
 - b. General year-long bird survey - every five years using the same methodology described in the study provided in Appendix B of the Mission Bay Park Natural Resource Plan - Technical Appendices document.
 - c. A California least tern foraging study will be conducted annually from 1989-1991. The methodology for the first year (1989) is provided in Appendix C of the Mission Bay Park Natural Resource Plan - Technical Appendices document.
- Data obtained from or in cooperation with other organizations include:
- a. Annual least tern nesting data - Least Tern Recovery Team, U.S. Fish and Wildlife Service.
 - b. Fish population studies - National Marine Fisheries Service and Hubbs Research Institute.
 - c. Clapper rail and Belding's savannah sparrow population and nesting data and other information collected in the Northern Wildlife and Southern Wildlife Preserves - University of California at San Diego.
 - d. Water quality data - Regional Water Quality Control Board.

4. A nature center complex, including a system of nature trails, will be developed in Mission Bay Park. The possible locations are: 1) Fiesta Island as part of the new preserve system, closest to the road; or 2) the western edge of the Crown Point Shores expansion of the Northern Wildlife Preserve (assuming this site is released from the least tern nesting site designation) (Figure 5). The proposed nature center complex will include: a nature trail system along the fringes of the marsh, closest to the nature center; interpretive exhibits and signs; observation platforms; and a small structure (about 1,000 square feet) for lecture, orientation, and meeting purposes. The Nature Center complex design will maintain the integrity of the marsh environment and limit the potential for human disturbance. All structures will be built prior to habitat restoration, excluding dredging of embayment if Fiesta Island site is chosen, to eliminate impacts to newly rehabilitated habitats. A design will be prepared for the Nature Center complex and surrounding preserve by a designer knowledgeable of interpretive centers and salt marsh/salt pan rehabilitation.
5. Zones for educational and research uses will be identified for each preserve as well as buffer areas with no human disturbance.
6. Graduate student proposals for studies to gather unknown information on natural resources will be reviewed by the Mission Bay Park Technical Advisory Committee. The committee will recommend certain studies for funding. Potential funding would come from grants or the City. If the City will be funding a study, the City would have the ultimate choice of which study to fund.

IMPLEMENTATION

FEDERAL AND STATE AGENCY PERMITS AND AGREEMENTS

In addition to City of San Diego permits, any proposed project must obtain a California Coastal Commission Permit and a U.S. Army Corps Engineers 404 and/or Section 10 permits if dredging or deposition of material is proposed. Permit requirements of the State Lands Commission and Regional Water Quality Control Board would also have to be met for dredging activities or inwater construction. This Natural Resource Management Plan was undertaken partly to facilitate and expedite the federal and state permit process. This Plan provides the basis for a common understanding among government agencies, including City of San Diego, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Coastal Commission, California Department of Fish and Game, and private interests, regarding projects affecting natural resources in Mission Bay Park and the manner in which mitigation is to be undertaken.

Representatives from the City and five agencies, listed above, actively participated in the development of this Plan to ensure that the mitigation requirements are consistent with policies of their respective agencies. It is anticipated, therefore, that projects planned in conformance with the Natural Resource Management Plan will meet the requirements of the other permitting agencies, and permit processing can be simplified and the time minimized. This will provide increased certainty to applicants concerned with the granting of permits for their projects and to agencies concerned with the protection of natural resources.

A nationwide permit from the Army Corps of Engineers to cover City shoreline maintenance would further simplify the permitting process. This type of permit would cover all maintenance outlined in the Beach Maintenance section under "Land Use Proposals" for a five-year period and negate having to obtain individual permits for each action. It would be beneficial if a similar arrangement could be made with the Coastal Commission.

Federal and state agencies will be notified of all proposed projects affecting natural resources and the Natural Resource Management Plan. This includes land and water-oriented development proposals. Mitigation plans and mitigation monitoring reports for individual projects will also be submitted to these agencies for their review and comment. If a mitigation plan can be approved concurrent with the City's review process, federal and state permit processing will be expedited.

DEVELOPMENT RESPONSIBILITIES

The Natural Resource Management Plan covers three general categories of proposals: 1) new development or redevelopment of land and water; 2) park and shoreline maintenance activities; and 3) habitat enhancement. It will

be the responsibility of the City or public applicant to plan, implement, maintain, and monitor the mitigation effort. The applicant is also responsible for consulting with state and federal resource agencies early in the planning process. A list of agencies for consultation is included in Appendix D in the Mission Bay Park Natural Resource Plan - Technical Appendices.

Mitigation Planning: For any development plan, the project applicant will have a biological consultant conduct a site-specific field survey. This survey will include underwater habitats, if any water-oriented aspects are proposed, to determine the type and extent of natural resources and to identify possible mitigation requirements. A qualified biologist with wetlands experience must perform the field work and consultation.

If a revegetation plan is required, a biological consultant, who may work with the applicant's landscape architect and/or planner, will outline the mitigation proposal. Revegetation plans will contain the following: a landscape plan which addresses in detail the compensation concept and design criteria; the types and extent of habitats to be developed; grading requirements (if any); plant materials to be used; method of planting; and plans for maintenance and monitoring of the revegetation. The City will review and approve revegetation plans before project approval is granted.

A binding mechanism will be instituted to ensure an applicant will implement, maintain, and monitor the mitigation effort as planned and approved. This mechanism can be a bond or other means of assuring funds will be available to complete the mitigation program. In cases where mitigation habitat area is to be purchased from an already existing City mitigation bank, the acceptability of the project as a participant in the bank will need to be approved by the City and the required mitigation area purchased prior to project development.

Mitigation Implementation: Mitigation programs will be implemented according to mitigation plans preceding or coincident with project construction. This includes the purchase of mitigation area from a mitigation bank. Wherever necessary, exotic or invader vegetation will be removed and an irrigation system will be installed to water plants until they have become established.

After project construction is complete, a second habitat survey of impacted areas will be conducted by a qualified biologist to ensure the success of the mitigation plan.

Mitigation Maintenance: Mitigation and enhancement plans will include a long-term monitoring program to determine the success of the plan and identify maintenance needs. In the first three to five years after plan implementation, monitoring will be conducted and reports made to the Park and Recreation Department on a regular basis. The frequency of monitoring will be determined during the mitigation plan approval process. After the first three to five years, mitigation sites will be monitored to obtain

information regarding species and quantity and quality of their growth. An annual report of the monitoring effort will be prepared and submitted to the Park and Recreation Department. The report will address plant survival, vegetative cover, the success of establishing designated habitats, and recommended actions necessary to accomplish full mitigation. Resource agencies will receive copies of mitigation monitoring reports.

The applicant will be responsible for maintaining revegetated mitigation sites for five years from the date the planting is completed. Replacement of vegetation and elimination of undesirable species will be undertaken as part of the mitigation maintenance program.

Any vegetation that dies or is otherwise damaged within the first few years due to flooding, disease, over-or under-watering, vandalism etc., will be replaced by the applicant. Vegetation should be monitored on a regular basis and replaced as needed to fulfill mitigation plan conditions.

In order for mitigation areas to be successfully established, non-native plants which compete with native plants for light and space must be controlled. Non-native species, such as giant reed (*Arundo donax*), pampas grass (*Cortaderia atacamensis*), castor bean (*Ricinius communis*), and tamarisk (*Tamarix* spp.) must be removed from all mitigation sites. Any non-native plants should be removed biannually during the five-year maintenance period. Once removed, the plants should be disposed of in a landfill.

CITY RESPONSIBILITIES

Planning for the protection and enhancement of natural resources in Mission Bay Park is an important part of the Mission Bay Park Master Plan, Local Coastal Program Addendum. The Mission Bay Park Natural Resource Management Plan is in conformity with and should be used in conjunction with the Master Plan and the Local Coastal Program Addendum.

The City Planning and Park and Recreation departments are responsible for the administration of the Natural Resource Management Plan. The Planning Department will review all public and City development proposals to determine conformity with the Natural Resource Management Plan. The California Environmental Quality Act (CEQA) process will be applied to determine the environmental impacts of development proposals and identify mitigation measures and alternatives to reduce impacts to Mission Bay Park's natural resources.

The Park and Recreation Department is responsible for conducting maintenance activities in the Park in compliance with the Natural Resource Management Plan. The Park and Recreation Department will review public and City project plans along with revegetation and mitigation plans to ensure the projects meet the requirements and objectives of the Natural Resource Management Plan. Enhancement projects and a current data base are also the responsibility of the Park and Recreation Department. Mitigation bank development will be developed and administered by Park and Recreation.

Funding for enhancement, management, and preserve maintenance for the Park's natural resource system can come from a variety of sources. Items outlined in this management plan are listed below with possible funding sources.

1. Mission Bay Least Tern Management Program
 - a. Predator Control - one person for six months (March-September), annually, via contract with USFWS or CDFG or City sources for implementation of a predator control program. Potential funding: operating budget.
 - b. Nesting Site Monitor - provide one person once a week for sixteen weeks to help monitor nesting sites. Approximately 130 hours a year. Potential funding: intern program.
 - c. Management and Improvements to Sites - Potential funding: operating budget.
2. Expansion of Preserve System
 - a. Extension of Southern Wildlife Preserve - no cost to implement.
 - b. Extension of Northern Wildlife Preserve to Include Crown Point Shores Least Tern Nesting Site and, possibly, a portion or all of the Campland lease area - grading, revegetation, and fencing required. Potential funding: Environmental License Plate Grant; Coastal Conservancy; possible future state bond initiatives; capital outlay fund.
 - c. Creation of New Wildlife Habitat Preserve and Embayment in South Fiesta Island - grading, dredging, revegetation, and fencing required. Potential funding: Environmental License Plate Grant; Coastal Conservancy; possible future state bond initiatives; cost recovery for embayment as an eelgrass mitigation bank could come from future City and developer projects purchasing mitigation area from the bank; capital outlay fund.
 - d. Mitigation Bank in South Shores Embayment - planting of eelgrass and monitoring program. Potential funding: Coastal Conservancy; cost recovery from future City and developer projects purchasing mitigation area from the bank; capital outlay fund.
3. Removal of pampas grass from Fiesta Island and Northern and Southern Wildlife Reserves - Potential funding: operating budget.
4. Placement of Additional Buoys Along Northern Wildlife Preserve - 15 additional buoys to discourage boaters and jet skiers from entering the salt marsh. Potential funding: Environmental License Plate Grant; Coastal Conservancy.

5. Informational, Directive, and Educational Signs - additional permanent signage needed for seven least tern and five (possibly six) wildlife preserves, approximately 150 signs. Potential funding: Environmental License Plate Grant; Coastal Conservancy; possible future state bond initiatives; operating budget.
6. City-sponsored Surveys
 - Eelgrass/underwater habitat survey by consultant (approximately 600 hours and \$16,000 (1988 dollars) for equipment and computer time);
 - General bird survey by interns or consultants (approximately 500 hours); and
 - California least tern foraging study by consultant (annual cost estimate for the three-year (1989-1991) study is \$18,000 per year (1989 dollars).

Potential funding: operating budget.
7. Nature Center Complex- includes nature trails, observation platforms, structure (approximately 1,000 square feet), fence, signs, and interpretive displays. Potential funding: Environmental License Plate Grant; Coastal Conservancy; possible future state bond initiatives; capital outlay fund.

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